

REPORT
TO THE
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
ON THE
WEST AND SOUTHWEST BRANCHES
OF THE
HOUSATONIC RIVER
PITTSFIELD, MASSACHUSETTS
PRELIMINARY ENGINEERING ANALYSIS
OF
NON-STRUCTURAL FLOOD DAMAGE PREVENTION

Draft.



Hayden, Harding & Buchanan, Inc.
Consulting Engineers

JUNE 1979

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>PAGE</u>
LETTER OF TRANSMITTAL	
TABLE OF CONTENTS	i
INTRODUCTION	1 - 2
SUMMARY	3 - 5
REPORT	
I. PROCEDURE	
Field Study	6
Floodproofing Classifications	6 - 11
Costs	11 - 12
II. RESULTS OF NON-STRUCTURAL METHODS STUDIED	12 - 15
Table I through Table V	16 - 46
III. CONCLUSIONS	47 - 51
APPENDIX A - Description of Footnoted Structures	
APPENDIX B - Cost Calculations	
ATTACHMENTS	
Sheet 1 - Southwest Branch, 100 Year Flood Project Limits, Structures to be Raised or Demolished	
Sheet 2 - Southwest Branch, Standard Project Flood Project Limits, Structures to be Raised or Demolished	
Sheet 3 - West Branch, 100 Year Flood Project Limits, Structures to be Raised or Demolished	
Sheet 4 - West Branch, Standard Project Flood Project Limits, Structures to be Raised or Demolished	

INTRODUCTION

The following report is a preliminary analysis of the estimated costs for non-structural flood damage prevention for structures affected by two flood levels along the west and southwest branches of the Housatonic River in the City of Pittsfield, Massachusetts.

This report evaluated residential, commercial, and apartment buildings to determine what possible methods could be employed to floodproof these structures through various non-structural techniques.

Each structure was analysed to determine what non-structural flood technique could be appropriately used to protect each structure against two distinct flood levels, the 100 year flood and the Standard Project Flood (SPF). In a number of cases non-structural techniques of floodproofing were inappropriate and impractical. It was concluded that in these cases the use of non-structural techniques could not be applied without affecting the structural integrity of the building or severely limiting the practical use of the structure. Therefore, if a structure could not be floodproofed or raised above the flood level (an acceptable floodproofing technique), the structure was categorized as requiring demolition.

Sheets 1 through 4 of the Attachment shows the impact of the two flood levels investigated and what structures would require raising or demolition. All other structures evaluated within the study area could utilize non-structural flood techniques outlined in this report.

The information included in this study is not meant to be conclusive, but rather to provide a rough guide for the preliminary analysis phase from which future decisions may be made for a later, more detailed study. All work undertaken for this investigation was performed in accordance with Contract Number DACW 33-77-0066, Work Order Number 16.

SUMMARY

In order to develop estimated costs of floodproofing individual structures located along the two branches of the Housatonic River that would be subject to two distinct flood conditions, the following procedures were used: a field survey was performed to determine the type of structure and the estimated flood inundations. The structures were grouped into residential, commercial, and apartment categories. Costs of floodproofing were estimated according to the size of the structure and the extent of inundation.

Floodproofing of residential structures consisted of providing a peripheral drainage system, waterproofing and blocking up basement walls and raising foundations, and the provision of flood shields at building entries. The extent of these measures was dependent upon basement usage and the depth of inundation. Costs were estimated using unit perimeter prices proportioned to the size of the house. Commercial structures were considered using similar measures, however, the commercial usage of the structure and the estimated extent of damage was taken into account. No costs were applied for the purpose of floodproofing free-standing garages since it was assumed that water would enter the structure during a flood and exit during the recession without causing damage, nor for demolition of garages. Other categories consisting of apartment buildings and commercial structures were also studied. In some cases, due to the physical characteristics of the apartment building or commercial property, nonstructural floodproofing techniques are not

applicable. Such structures would require that earth berms be constructed with flood gates to provide access. However, if flood walls, berms, or other conventional means of flood protection were not practical, an estimated cost for demolishing the structure was developed as part of this report.

Structures were grouped along both the west and southwest branches of the Housatonic River into river reaches. The southwest branch river reaches according to location are:

Reach 1: Railroad Bridge to Barker Street

Reach 2: Barker Street to dam opposite Gale Avenue

The west branch river reaches according to location are:

Reach 1: Tel-Electric dam to West Street

Reach 2: West Street to Columbus Avenue

Reach 3: Columbus Avenue to Linden Street

Reach 4: Linden Street to Pontoosuc Avenue

In all cases which were investigated, approximately 63 percent were conventional one family residential dwellings. The majority of these structures required Type A, B, C, or D floodproofing (see PROCEDURE section) at an average cost per structure of thirteen and eighteen thousand dollars (\$13,000 & \$18,000) for the two flood conditions studied. About 21 percent of the structures studied were apartments and they required an average floodproofing cost per structure of twelve and sixteen thousand dollars (\$12,000 & \$16,000) for the two flood conditions. Commercial structures constituted about 16 percent

of the cases studied, and their floodproofing cost averaged one hundred twelve and one hundred fifty-eight thousand dollars (\$112,000 & \$158,000) for the two flood conditions.

REPORT

I. PROCEDURE

A. FIELD STUDY

The field study identified all structures which would be affected by the 100 year frequency and the Standard Project Flood (SPF). Structures were visually field evaluated for general condition, usage, size, first floor elevation, type of foundation and basement. Elevations were obtained from the Corps of Engineers photogrammetric topography plan. This plan had contours at five foot increments creating the need for estimating elevations. Photographs were taken and all observed changes from the topographic plan were recorded. It was observed during the field study that structures have been removed and new structures added since the date of the original plan. These changes have been reflected on the topography plan enclosed.

The above data was then compiled with respect to the elevation of the estimated flood surface (of the 100 year flood and the SPF) for each structure. These elevations were obtained from flood profiles developed by the U.S. Army Corps of Engineers, New England Division. The depth of inundation was then estimated and the proper classification of floodproofing determined for each case and for each flood condition.

B. FLOODPROOFING CLASSIFICATION

Generally, floodproofing for residential, apartment, and commercial structures was divided into seven major categories. The categories were determined by the depth of inundation and the basement usage. The

first three categories (Types A, B and C) were applied to structures where the proposed depth of inundation is below the first floor. Type D applies to cases where the flood waters are less than three feet above the first floor and all unusual cases were considered in a separate category (Type E) with each structure evaluated on an individual basis. Type F category applies to structures receiving no floodproofing. A final category (Type G) involves the case where the depth of inundation is greater than three feet above the first floor or there exists no practical means of floodproofing the structure. For this category, demolition of the structure would be required. Structures which could not be raised or floodproofed by conventional methods were listed under this category.

The following represents a breakdown of each category indicating the measures to be taken and the assumptions used in classification:

TYPE A

Type A floodproofing is used for structures that have unfinished basements with no storage. Type A floodproofing techniques consist of digging a trench in the basement floor and installing a drainage system to remove the water that accumulates. The trench would be located around the periphery of the basement approximately two feet inward from the walls. The trench should have a depth of about two feet. A system of six-inch diameter vitrified clay pipes leading to a sump hole containing a pump would be installed within the bottom of the trench and backfilled

with crushed stone. The sump pump would require a separate electric outlet and would be connected to an outside hose which would divert water away from the basement. The top four inches of the trench would be finished concrete in order to restore the basement to its original condition. Twelve (12) structures under the 100 year flood and six (6) under the SPF were placed in this category.

TYPE B

Type B floodproofing is used for structures that have finished basements with storage but no living accommodations. Houses in fair to excellent condition having basements were classified within this category. The procedures to be followed for this type of floodproofing consist of the Type A drainage system, as well as waterproofing of the outside of the basement walls. Waterproofing basement walls would require a trench be excavated around the outside periphery of the structure. The exposed basement walls would then be cleaned and waterproofing applied. The trench would be backfilled and compacted and the yard restored to its original condition. For the 100 year and the Standard Project Flood, 145 and 93 structures respectively required this method of floodproofing.

TYPE C

Type C floodproofing is applied to structures having finished basements being used for living quarters and storage. This technique requires the same measures as Type B with the additional precaution of blocking up all windows and doors. This would require the removal of

existing doors and windows, to be replaced with block masonry. This measure could cause problems with regard to local fire and building codes. Such related problems were not formally addressed within the scope of this report. Twenty-one (21) structures under the 100 year flood and fifteen (15) under the SPF were placed in this category.

TYPE D

Type D floodproofing is used for structures having basements which would receive a depth of inundation above the first floor. This technique would consist of the Type C technique with the additional measure of raising the foundation above the flood elevation. The raising of the foundation would require the structure be lifted by hydraulic jacks and temporarily supported by cribbing. All utility lines would be disconnected prior to this operation. The foundation would then be extended to the new elevation of the structure and the utilities reconnected. After the new foundation is completed, the jacks can be removed and the house and yard restored to their original condition. In order to perform this operation, it may be necessary to evacuate the occupants for approximately two to four weeks while construction is being completed. Forty (40) structures under the 100 year flood and seventy-four (74) structures under the SPF came under this category.

TYPE E

Type E floodproofing applies to residential and commercial cases which have a depth of inundation above the first floor, but cannot be

floodproofed by any of the already mentioned procedures. These structures were examined on an individual basis with explanations and costs presented in Appendix A. In all cases, a more detailed engineering investigation would be required prior to construction.

For those cases requiring flood shields, it should be noted that the shields are only installed during a flooding condition. Therefore, suitable warning time would have to be provided prior to a flood. Without this warning time, the structures would have limited protection which could result in substantial damage to the structures and their contents. For the 100 year flood and the SPF, sixteen (16) and thirty-four (34) structures respectively were grouped into this category.

TYPE F

Type F applies to structures which will receive no formal floodproofing under this study. Such structures are those which are not affected by either flooding condition or those for which the usage of the structure does not dictate formal floodproofing. One hundred three (103) structures and thirty-five (35) structures were grouped under this category for each of the two flooding conditions respectively.

TYPE G

Buildings that are placed into this category are structures that could not be floodproofed by any of the methods previously discussed.

Buildings placed into this category are structures which would receive a depth of inundation above or in excess of three feet above the

first floor, or because of the structures' construction or intended use the application of the floodproofing methods discussed would affect the building's structural integrity or severely limit the practical use of the building. Structures categorized under Type G were classified, for the purpose of this study, as requiring demolition.

C. COSTS

The costs for Types A, B, and C were obtained based on a unit cost per perimeter foot. The calculations used in formulating these costs are shown in Appendix B and the final rounded-off values are presented in Table III. Costs for Types A, B and C floodproofing were obtained by multiplying the perimeter by the unit cost. Type D floodproofing is estimated assuming Type C costs plus an additional lump sum based on the estimated cost of raising the foundation. Type E floodproofing is estimated on an individual basis with the explanation presented in Appendix A according to the footnote number. Type F floodproofing requires no formal procedure and therefore, no cost is assumed for this study. Structures listed under Category G and the associated demolition costs are presented in Appendix A and in Table I. Demolition costs are based upon \$0.10 per cubic foot, which is added to the estimated fair market value for total demolition cost (not including costs for the relocation and resultant social impact upon apartment tenants).

Since certain variables making up the floodproofing and foundation raising costs are related to the size of the building, different unit prices for different size buildings are presented in Table III. The

raw unit costs used in these calculations are based on typical values from the Robert Snow Means Company, Inc., 1979 Building Cost Data publication as well as estimates provided by local contractors and our own engineering judgment. Final costs were derived from the raw costs with operational adjustments. These adjustments consist of an additional 10 percent for contingencies or unforeseen construction difficulties, an additional 10 percent for general contractors' overhead and profit, and 10 - 20 percent for engineering and survey fees. For this study it was assumed that the engineering and survey fee would be 20 percent for Types A, B and C floodproofing, and 10 percent for foundation raising (Type D) where the experience of the contractor is most critical to the success of the operation.

II. RESULTS OF NON-STRUCTURAL METHODS STUDIED

Table I lists each structure examined during this investigation. Contained within this Table is the address, a code system describing the structure, the effect of the proposed flooding upon the structure and the recommended floodproofing technique and its cost. Also included in the Table is the estimated first floor elevation and perimeter of each structure. Commercial buildings or industrial buildings examined may also contain a footnote number. These numbers refer to Appendix A where the structure's description, usage and recommended floodproofing technique is presented on an individual basis. Within Table I, the column headed "Type" refers to a classification code system used in

describing the structure. The first letter of the code system refers to the primary use of the structure; "C" refers to a commercial structure; and "A" refers to an apartment building or complex containing more than four individual units. "R" refers to residential structures; and "I" refers to an industrial building or complex. The adjacent second letter is used to define the primary material from which the building is constructed. "W" refers to wood, "B" to block and "M" to metal. The next number immediately following these two letters refers to the number of stories. A number containing "1/2" refers to a structure containing a finished or semi-finished attic apparently used for living or storage. The final number refers to the basement. A zero ("0") indicates no basement or slab-on-grade. A "1" refers to a crawl-type basement; a "2" refers to an unfinished basement; a "3" refers to a finished basement; a "4" refers to an unfinished basement with an enclosed garage; a "5" refers to a finished basement with an enclosed garage; and a "6" refers to an unfinished basement with storage. For all structures whose overall condition is rated poor, a "*" follows the above code.

The column headed "Depth of Inundation" refers to the depth of water, above the basement floor, during each of the two proposed flood conditions examined. The column headed "Depth of Water above F.F." refers to the total height of water above the estimated first floor grade during the two floods. A zero in this column indicates that the water will not reach the first floor. In the case of a structure with a slab-on-grade foundation, the two columns will have the same value. The column headed

"Cost in Thousands" refers to the estimated costs for floodproofing each structure or the costs of demolition if applicable. The column headed "Estimated Market Value" is our estimation of the fair market value of those structures, including the land, that fall in the demolition category.

Table II represents a breakdown of all cases considered, grouping the structures according to Reach Number. Each structure within the Reach is further analyzed according to the type of structure, the size and the recommended floodproofing technique.

Table III represents the estimated cost of different floodproofing techniques. Table values were obtained according to procedures described in Section I-C of this Report.

Tables IV and V represent the estimated cost for each Reach category respectively. Values used in these Tables were obtained from tabulation of quantities presented in Table I.

DESCRIPTION OF SYMBOLS
USED IN TABLE I

ADDRESS			BASED ON PHOTOGRAMMETRIC TOPOGRAPHY PLAN		DEPTH OF FLOOD WATERS ABOVE BASEMENT (FIRST FLOOR FOR SLAB-ON-GRADE)		DEPTH OF FLOOD WATERS ABOVE FIRST FLOOR		ESTIMATED COST OF FLOODPROOFING				REFERS TO APPENDIX A DESCRIPTION
STREET	HOUSE NO	TYPE	ESTIMATED FF ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF INUNDATION		DEPTH OF WATER ABOVE F.F.		PROPOSED FLOOD PROOF TECHNIQUE		COST IN \$ 1000.00'S		FOOTNOTE #
					1936	S.P.F.	1936	S.P.F.	1936	S.P.F.	1936	S.P.F.	
Adams Street	35	CW-2-2 *	395	160	16	20	5	9	G	G	1.5	1.5	
Mechanic Street	52	CB-1-2	397	570	7	10	0	0	E	E	3.3	3.3	1
Cotton Street	36	RW-2-2	407	160	3	7	0	0	B	B	9.1	9.1	

Poor Condition

Category

A- APARTMENT
C- COMMERCIAL
R- RESIDENTIAL
I- INDUSTRIAL

Predominant
Structural Material

B- BRICK OR BLOCK
W- WOOD
M- METAL

Basement Usage

0- NO BASEMENT
1- UNFINISHED BASEMENT, NO STORAGE
2- FINISHED BASEMENT WITH STORAGE
3- FINISHED BASEMENT LIVING AREA
4- UNFINISHED BASEMENT WITH ENCLOSED GARAGE
5- FINISHED BASEMENT WITH ENCLOSED GARAGE
6- UNFINISHED BASEMENT WITH STORAGE

Number Of Floors

Floodproofing Technique

TYPE A- PERIPHERIAL DRAINAGE SYSTEM ONLY
TYPE B- TYPE A PLUS WATERPROOF OUTSIDE
OF BASEMENT WALLS
TYPE C- TYPE B PLUS BLOCKING UP OF
WINDOWS
TYPE D- TYPE C PLUS RAISING FOUNDATION
TYPE E- UNUSUAL CONDITIONS - SEE FOOTNOTE
TYPE F- NO FORMAL FLOODPROOFING TECHNIQUE
TYPE G- FLOODPROOFING NOT PRACTICAL --
DEMOLITION OF STRUCTURE

TABLE I

REACH NO. 2

SW Branch

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Barker Road	114	RW-2-6	995	110	0	0	0	7		F	G	\$ 38,000	0.0	39.9
(Armory Garage)														
Cadwell Road	---	CB-1-0	987	250	0	7	0	7		F	G	120,000	0.0	123.9
(Two Buildings) Cadwell Road	106	CW-2-6	982	126	5	12	13	20		G	G	80,000	85.0	85.0
Cadwell Road	111	RW-1½-2	985	120	2	9	10	17		D	G	30,000	13.8	32.3
Cadwell Road	116	RW-2-3	982	124	5	12	13	20		G	G	31,000	33.4	33.4
Cadwell Road	120	RW-1-4	982	160	5	12	13	20		G	G	40,000	42.1	42.1
Cadwell Road	123	RW-1-3	985	132	2	9	10	17		D	G	33,000	14.2	34.4
Cadwell Road	127	RW-1½-5	987	96	0	7	8	15		C	G	29,000	6.5	30.0
Cadwell Road	130	RW-1-5	982	156	5	12	13	20		G	G	38,000	40.0	40.0
Cadwell Road	131	RB-1-5	987	100	0	7	8	15		C	G	29,000	6.7	29.8
Cadwell Road	136	RW-1½-3	985	112	2	9	10	17		D	G	30,000	13.5	31.6
Cadwell Road	141	RW-1½-6	987	124	0	7	8	15		B	G	31,000	7.3	32.9
Cadwell Road	190	RW-2½-6	983	128	4	11	12	19		G	G	32,000	35.1	35.1
Cadwell Road	200	CW-1-0	981	140	6	13	6	13		G	G	35,000	36.2	36.2
Cadwell Road	203	RW-2-6	984	100	3	10	11	18		G	G	29,000	30.6	30.6

SW Branch

TABLE I

REACH NO. 2

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S. P. F.	100 YR	S. P. F.		100 YR	S. P. F.		100 YR	S. P. F.
Cadwell Road	207	RW-2-6	982	124	5	12	13	20		G	G	\$ 31,000	33.4	33.4
Cadwell Road	229	RW-1½-6	987	136	0	7	8	15		B	G	34,000	8.5	36.3
Cadwell Road	231	RW-1½-3	987	108	0	7	8	15		C	G	30,000	7.1	31.5
Cadwell Road	233	RW-2-6	983	112	4	11	12	19		G	G	30,000	32.0	32.0
(Access behind 136 Cadwell) Cadwell Road	---	RW-2½-6	978	104	9	16	17	24		G	G	30,000	32.0	32.0
Gale Avenue	2	RW-1½-6	978	130	9	16	17	24		G	G	32,000	34.1	34.1
Gale Avenue	8	RW-2½-2	983	140	4	11	12	19		G	G	35,000	38.7	38.7
Gale Avenue	16	RW-1½-3	983	160	4	11	12	19		G	G	40,000	43.2	43.2
Gale Avenue	22	RW-2-2	984	140	3	10	11	18		G	G	35,000	38.1	38.1
Gale Avenue	27	RW-2-2	988	152	0	6	7	14		B	G	38,000	8.8	41.6
Gale Avenue	28	RB-2-6*	993	120	0	1	2	9		A	D		4.2	13.8
Gale Avenue	32	RB-1½-3	998	160	0	0	0	4		C	C		9.8	9.8
Gale Avenue	33	RW-2-6	995	124	0	0	0	7		F	B		0.0	7.3
Greendale Avenue	4	RW-1-0	983	70	4	11	4	11		G	G	25,000	25.5	25.5

SW Branch

TABLE I

REACH NO. 2

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00's	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Greendale Avenue	21	RW-1-3	997	80	0	0	0	5		C	C		5.7	5.7
Greendale Avenue	22	RW-2½-6	995	80	0	0	0	7		B	B		5.1	5.1
Greendale Avenue	24	RW-2-4	1000	120	0	0	0	2		F	B		0.0	7.1
Greendale Avenue	31	RW-2-6	997	120	0	0	0	5		F	B		0.0	7.1
Greendale Avenue	34	RW-1-4	1000	120	0	0	0	2		F	B		0.0	7.1
Greendale Avenue	48	AW-2-4	1000	144	0	0	0	2		F	B		0.0	8.3
(WBEC Radio) Jackson Street	211	CB-1-0	985	350	2	9	2	9	1	E	E		21.0	32.0
Jackson Street	217	RW-1½-3	994	132	0	0	1	8		C	C		8.3	8.3
Jackson Street	223	RW-2-2	990	132	0	4	5	12		B	G	\$ 33,000	7.8	35.7
W.Housatonic St.	418	RW-1½-3	991	128	0	3	4	11		C	D		8.1	14.2
W.Housatonic St.	421	RW-2-2	998	120	0	0	0	4		F	B		0.0	7.1
W.Housatonic St.	422	RW-2-6	993	100	0	1	2	9		B	D		6.2	13.0
W.Housatonic St.	427	RW-2-2	987	148	0	7	8	15		B	G	38,000	8.5	41.4
W.Housatonic St.	433	RB-1-0	982	216	5	12	5	12		G	G	40,000	44.4	44.4

SW Branch

TABLE I

REACH NO. 2

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
"Big N"Shopping Plaza W.Housatonic St.	---	CB-1-0	979	2020	8	15	8	15	2	E	E	\$2,550,000	3060.	3060.
McDonalds W.Housatonic St.	---	CB-1-0	976	240	11	18	11	18	3	E	E	180,000	187.2	187.2
W.Housatonic St.	472	RW-1-0	976	116	11	18	11	18	4	E	E	29,000	30.3	30.3
Fitch Motel - 22 Units W.Housatonic St.	---	CW-1-0	976	520	11	18	11	18	4	E	E	330,000	343.2	343.2
Diner W. Housatonic St.	---	CW-1-0	977	112	10	17	10	17	4	E	E	10,000	11.2	11.2
Shell Station W.Housatonic St.	484	CB-1-0	975	188	12	19	12	19	4	E	E	33,000	51.3	51.3
Sunoco Station W.Housatonic St.	---	CB-1-0	975	340	12	19	12	19	5	E	E	90,000	114.0	114.0
W.Housatonic St.	490	RB-2-3	978	102	9	16	17	24		G	G	29,000	30.6	30.6
W.Housatonic St.	541	RW-2-2	993	104	0	1	2	9		B	D		6.2	13.2
W.Housatonic St.	565	RB-1-3	988	120	0	6	7	14		C	G	30,000	7.6	31.4
W.Housatonic St.	572	RW-2-2	986	132	1	8	9	16		D	G	33,000	14.3	35.7
W.Housatonic St.	573	RW-2-5	984	100	3	10	11	18		G	G	29,000	30.6	30.6
W.Housatonic St.	577	RW-1½-2	983	120	4	11	12	19		G	G	30,000	31.8	31.8
W.Housatonic St.	578	RW-2-6	982	100	5	12	13	20		G	G	29,000	30.6	30.6
Mobil Station W.Housatonic St.	581	CB-1-0	982	160	5	12	5	12	6	E	E	24,000	41.4	41.4
W.Housatonic St.	582	RW-1-3	981	148	6	13	14	21		G	G	38,000	40.1	40.1

SW Branch

TABLE I

REACH NO. 2

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
W.Housatonic St.	586	RW-1½-2	980	132	7	14	15	22		G	G	\$ 33,000	35.2	35.2
W.Housatonic St.	590	RB-1-0	979	118	8	15	8	15		G	G	29,000	30.3	30.3
W.Housatonic St.	591	RW-2½-2	985	100	2	9	10	17		D	G	29,000	13.0	30.9
W.Housatonic St.	596	RW-1½-2	983	120	4	11	12	19		G	G	30,000	31.8	31.8
W.Housatonic St.	595 -597	AB-2-6	985	160	2	9	10	17		D	G	40,000	15.6	44.0
Body Shop W.Housatonic St.	607	CB-1-0	982	200	5	12	5	12	7	E	E	38,000	43.0	43.0
Tire Shop W.Housatonic St.	615	CB-1-0	983	240	4	11	4	11	8	E	E	54,000	61.2	61.2
Woodleigh Road	20	RB-1½-3	986	120	1	8	9	16		D	G	30,000	13.8	31.8
Woodleigh Road	30	RB-1-6	990	160	0	4	5	12		B	G	40,000	9.1	42.4
Woodleigh Road	40	RW-1½-2	1000	120	0	0	0	2		F	B		0.0	7.1
Zoar Street	9-11	AB-2½-6	982	120	5	12	13	20		G	G	30,000	32.7	32.7
Zoar Street	15 - 17	AW-2½-2	989	120	0	5	6	13		B	G	30,000	7.1	32.7

W. Branch

TABLE I

REACH NO. 1

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Apt. Complex, 24 Apts./Unit Deering Street	10	AW-3-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0
Deering Street	20	AW-3-0	1003	N/A	0	0	0	0	*	F	F		0.0	0.0
Deering Street	30-32	AW-3-0	1002	N/A	0	0	0	0	*	F	F		0.0	0.0
Deering Street	40	AW-3-0	1000	N/A	0	0	0	0	*	F	F		0.0	0.0
Deering Street	50-52	AW-3-0	997	N/A	0	0	0	0	*	F	F		0.0	0.0
Deering Street	60-62	AW-3-0	999	N/A	0	0	0	0	*	F	F		0.0	0.0
Northeast Utilities Service Center West Street	---	CB-1-0	1000	N/A	0	0	0	0	*	F	F		0.0	0.0

W. Branch

TABLE I

REACH NO. 2

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
* Columbus Avenue	297	AB-3-6	1002	240	0	1	3	9		B	D		13.5	18.0
Riverside Cafe Columbus Avenue	301	CB-2-6	1001	120	0	2	4	10	9	B	E	\$ 14,000	7.1	16.3
Columbus Avenue	323	RW-2-3	1000	140	0	3	5	11		C	D		8.7	14.7
Columbus Avenue	329	RW-2-2	1004	140	0	0	1	7		B	B		8.1	8.1
Columbus Avenue	337	RW-2-3	1008	160	0	0	0	3		F	C		0.0	9.8
Dewey Avenue	73	RW-2-3	1008	160	0	0	0	3		F	C		0.0	9.8
Dewey Avenue	73R	RW-2-6*	993	110	4	10	12	18		G	G	6,000	7.9	7.9
Dewey Avenue	79	RW-2-2	1004	110	0	0	1	7		B	B		6.6	6.6
West Street	306	RW-2-3	1006	170	0	0	0	5		F	C		0.0	10.3
West Street	310	RW-2-3	1004	130	0	0	1	7		C	C		8.2	8.2

W.Branch

TABLE I

REACH NO. 3

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Bradford Street	275-277	AW-2-6	1008	200	0	0	0	3		F	B		0.0	11.3
Bradford Street	279	RW-2-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0
Bradford Street	280	RW-2-2	1008	160	0	0	0	3		F	B		0.0	9.2
Bradford Street	283	RW-2-2	1008	150	0	0	0	3		F	B		0.0	8.6
Bradford Street	282-284	AW-2½-6	1008	210	0	0	0	3		F	B		0.0	11.8
Bradford Street	287	RW-1½-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0
Bradford Street	288-290	AW-2½-1	1007	N/A	0	0	0	0	*	F	F		0.0	0.0
West Side Fish Market														
Columbus Avenue	300	CB-1-0	1000	130	0	3	0	3	10	F	E	\$ 16,000	0.0	18.6
Columbus Avenue	314-316	AW-2-2	1000	190	0	3	7	11		B	D		10.7	16.7
Columbus Avenue	322	RW-2-6	1000	140	0	3	7	11		B	D		8.1	14.7
Columbus Avenue	326-328	AW-2-3	1004	210	0	0	3	7		C	C		12.8	12.8
Columbus Avenue	334	CB-1-0	1008	N/A	0	0	0	0	*	F	F		0.0	0.0
Dewey Avenue	96	RW-2½-6	1005	200	0	0	2	6		B	B		11.3	11.3
Milton's Place														
Dewey Avenue	97	CB-1-0	998	90	1	5	1	5	11	E	G	8,000	8.5	8.5

W. Branch

TABLE I

REACH NO. 3

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Dewey Avenue	102	RW-2-1	996	250	3	7	6	10		D	G	\$ 24,000	18.0	33.8
Dewey Avenue	107	RW-2-6	996	120	3	7	11	15		D	G	15,000	13.8	17.3
Dewey Avenue	110	RW-2-1	1000	160	0	3	2	6		A	D		5.5	15.6
Dewey Avenue	111	RW-2-6	996	130	3	7	11	15		D	G	15,000	14.3	17.6
Dewey Avenue	113	RW-2-1	997	100	2	6	5	9		D	G	15,000	13.0	16.6
Dewey Avenue	114	RW-2-6	998	150	1	5	9	13		D	G	18,000	15.1	21.7
Dewey Avenue	117 119 121	RW-2-2	999	230	0	4	8	12		B	G	43,000	13.0	51.2
Dewey Avenue	122	CB-2-6	1004	170	0	0	3	7		B	B		9.6	9.6
Dewey Avenue	125	RW-2-1*	996	100	3	7	6	10		D	G	8,000	13.0	9.6
Dewey Avenue	129	RW-2-3	998	120	1	5	9	13		D	G	15,000	13.8	17.3
Dewey Avenue	135 137	AW-2-6	998	160	1	5	9	13		D	G	21,000	15.6	25.0
Dewey Avenue	141	RW-2½-2	998	140	1	5	9	13		D	G	16,000	14.7	19.7
Dewey Avenue	143 145	AW-2½-2	998	140	1	5	9	13		D	G	16,000	14.7	19.7
Dewey Avenue	147	RW-2½-2	998	150	1	5	9	13		D	G	18,000	15.1	21.7
Dewey Avenue	154	CB-2-0	1000	160	0	3	0	3	12	F	E		0.0	5.0
Dewey Avenue	155	RW-2-2	998	130	1	5	9	13		D	G	15,000	14.3	17.6

W. Branch

TABLE I

REACH NO. 3

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Dewey Avenue	159	RW-2-1	998	130	1	5	4	8		D	G	\$ 20,000	14.3	22.6
Dewey Avenue	165	CB-1-0	995	280	4	8	4	8		G	G	38,000	42.9	42.9
Dewey Avenue	166	RW-1½-2	1001	130	0	2	6	10		B	D		7.6	14.3
Dewey Avenue	168	AW-2-6*	1004	200	0	0	3	7		B	B		11.3	11.3
Dewey Avenue	169	RW-2-1	998	120	1	5	4	8		D	G	13,500	13.8	15.8
Dewey Avenue	172-174	AW-2-6	1003	240	0	0	4	8		B	B		13.5	13.5
Dewey Avenue	173	RW-2½-6	1000	180	0	3	7	11		B	D		10.2	16.4
Dewey Avenue	175	RB-2-0	1001	120	0	2	0	2	13	F	E	14,000	0.0	16.3
Dewey Avenue	181	RW-2½-1	1001	190	0	2	1	5		A	D		6.5	16.7
Dewey Avenue	185-187	AW-2-1	1001	160	0	2	1	5		A	D		5.5	15.6
Dewey Avenue	189	RW-2-6	1001	140	0	2	6	10		B	D		8.1	14.7
Dewey Avenue	192	RW-2-1	1005	120	0	0	0	1		F	A		0.0	4.2
Dewey Avenue	193	RW-2-1	1001	170	0	2	1	5		A	D		5.8	16.0
Dewey Avenue	194	RW-2-2	1005	140	0	0	2	6		B	B		8.1	8.1
Dewey Avenue	198	RW-2-2	1005	130	0	0	2	6		B	B		7.6	7.6
Dewey Avenue	199	RW-2-1	1001	150	0	2	1	5		A	D		5.2	15.1

W. Branch

TABLE I

REACH NO. 3

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Dewey Avenue	203	RW-2-6	1001	180	0	2	6	10		B	D		10.2	16.4
Dewey Avenue	204	AW-3-6	1007	210	0	0	0	4		F	B		0.0	11.8
Dewey Avenue	205-207	AW-2-1	1001	140	0	2	1	5		A	D		4.9	14.7
John Street	10	RW-2-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0
John Street	14	RW-2-6	1006	160	0	0	1	5		B	B		9.2	9.2
John Street	20	RW-2-2	1005	200	0	0	2	6		B	B		11.3	11.3
John Street	24-26	AW-2-6	1004	180	0	0	3	7		B	B		10.2	10.2
John Street	43-45	AW-2-6	1011	N/A	0	0	0	0	*	F	F		0.0	0.0
John Street	44	RW-2-2	1003	200	0	0	4	8		B	B		11.3	11.3
John Street	46	RW-2-6	1000	130	0	3	7	11		B	D		7.6	14.3
John Street	47	RW-2-6	1010	170	0	0	0	1		F	B		0.0	9.6
John Street	50-52	AW-2-2	1000	180	0	3	7	11		B	D		10.2	16.4
John Street	51-53	AW-2-1	1008	N/A	0	0	0	0	*	F	F		0.0	0.0
John Street	54	RW-2½-6	1000	100	0	3	7	11		B	D		6.2	13.0
Berkshire Bakery John Street	56	CW-2-0	995	424	4	8	4	8		G	G	\$112,000	140.1	140.1

W. Branch

TABLE I

REACH NO. 3

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
John Street	62-68	AW-2-6	1000	200	0	3	7	11		B	D		11.3	17.1
John Street	62-68R	CW-2-1	998	240	1	5	4	8		D	G	\$ 2,000	18.0	11.0
John Street	70	RW-2½-6	1000	150	0	3	7	11		B	D		8.6	15.1
John Street	71	RW-2-2	1002	150	0	1	5	9		B	D		8.6	15.1
John Street	72	RW-2-6	1000	110	0	3	7	11		B	D		6.6	13.4
John Street	75	RW-2-6	1003	140	0	0	4	8		B	B		8.1	8.1
John Street	76	RW-2-6	1000	100	0	3	7	11		B	D		6.2	13.0
John Street	77-79	AW-2-6	1004	200	0	0	3	7		B	B		11.3	11.3
John Street	78-80	RW-2½-2	1000	140	0	3	7	11		B	D		8.1	14.7
John Street	82	RW-2½-6	1000	150	0	3	7	11		B	D		8.6	15.1
John Street	86	RW-2-1	1000	160	0	3	2	6		A	D		5.5	15.6
John Street	87-89	AW-2-1	1004	150	0	0	0	2		F	A		0.0	5.2
John Street	90	RW-2-0*	999	160	0	4	0	4		F	G	22,000	0.0	26.0
John Street	94	RW-2-1	1000	100	0	3	2	6		A	D		3.6	13.0
John Street	95	RW-2-2	1007	140	0	0	0	4		F	B		0.0	8.1
John Street	96	RW-2-6	1000	245	0	3	7	11		B	D		13.8	18.0

W. Branch

TABLE I

REACH NO. 3

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
John Street	99-101	AW-2-6	1004	225	0	0	3	7		B	B		12.7	12.7
John Street	100	RW-2-6	1000	155	0	3	7	11		B	D		8.9	15.3
John Street	104	RW-2-2	998	150	1	5	9	13		D	G	\$ 22,000	15.1	25.5
John Street	107-113	AW-2-6	1001	150	0	2	6	10		B	D		8.6	15.1
Nagelschmidt's Market Linden Street	171	CW-2-6	1008	225	0	0	0	3		F	B		0.0	12.7
Linden Street	177	RW-2-1	1002	155	0	1	0	4		F	D		0.0	15.3
Linden Street	181	CB-1-6	1000	100	0	3	7	11		B	D		6.2	13.0
Amoco Station Linden Street	198	CB-1-0	997	175	2	6	2	6	14	E	E	48,000	68.0	68.0
Linden Street	207-209	AW-2-6	1004	140	0	0	3	7		B	B		8.1	8.1
Linden Street	211-213	AW-2-6	1010	230	0	0	0	1		F	B		0.0	13.0
Prospect Street	38	RW-2-6	1005	150	0	0	2	6		B	B		8.6	8.6
Prospect Street	39-41	AW-2½-6	1004	190	0	0	3	7		B	B		10.7	10.7
Prospect Street	42	RW-2-2	1003	170	0	0	4	8		B	B		9.6	9.6
Prospect Street	45	RW-2½-6	1002	180	0	1	5	9		B	D		10.2	16.4

W. Branch

TABLE I

REACH NO. 3

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Prospect Street	46	RW-2½-2	1000	160	0	3	7	11		B	D		9.2	15.6
Prospect Street	47	RW-2½-6	1000	160	0	3	7	11		B	D		9.2	15.6
Prospect Street	50	RW-2½-6*	998	180	1	5	9	13		D	G	\$ 27,000	16.4	33.1
Southern Avenue	13-15	AW-2-2	1005	180	0	0	2	6		B	B		10.2	10.2
Southern Avenue	16	RW-2-2	1004	130	0	0	3	7		B	B		7.6	7.6
Southern Avenue	19-21	AW-2-6	1001	140	0	2	6	10		B	D		8.1	14.7
Southern Avenue	20	RW-2-1	1000	140	0	3	2	6		A	D		4.9	14.7
Southern Avenue	24	RW-2-1	998	160	1	5	4	8		D	G	24,000	15.6	28.0
Southern Avenue	28	AW-2-6	998	140	1	5	9	13		D	G	21,000	14.7	24.1

TABLE I														REACH NO. 4	
W. Branch		HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
STREET						100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Danforth Avenue	20	RW-2-6	1'003	180	0	1	4	9			B	D		10.2	16.4
Danforth Avenue	22	RW-2-3	1003	90	0	1	4	9			C	D		6.2	12.6
Danforth Avenue	30	RW-2-2	1003	160	0	1	4	9			B	D		9.2	15.6
Danforth Avenue	36	RW-2-3	1005	160	0	0	2	7			C	C		9.8	9.8
Danforth Avenue	42	RW-2-2	1004	130	0	0	3	8			B	B		7.6	7.6
Danforth Avenue	44-46	AW-2-2	1002	160	0	2	5	10			B	D		9.2	15.6
Danforth Avenue	45	RW-2-6	1003	160	0	1	4	9			B	D		9.2	15.6
Danforth Avenue	48	RW-2-2	1002	130	0	2	5	10			B	D		7.6	14.3
Danforth Avenue	50	RB-1½-0	1001	140	0	3	0	3	15		F	E		0.0	1.1
Danforth Avenue	65	RW-2-2	1004	130	0	0	3	8			B	B		7.6	7.6
Danforth Avenue	72-74	AW-2-1	996	160	3	8	6	11			D	G	32,000	15.6	36.0
Danforth Avenue	82	RW-2-0	996	120	3	8	3	8	16		E	G	18,000	20.3	20.3
Danforth Avenue	84	RW-2-1	997	120	2	7	5	10			D	G	18,000	13.8	20.3
Danforth Avenue	88	RW-1½-1	998	80	1	6	4	9			D	G	8,000	12.2	8.8
Danforth Avenue	90-92	AW-2-6	997	130	2	7	10	15			D	G	21,000	14.3	23.6
Danforth Avenue	94-96	AW-2-6	1000	170	0	4	7	12			B	G	36,000	9.6	40.5

W. Branch

TABLE I

REACH NO. 4

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Danforth Avenue	100	RW-2-2	1003	180	0	1	4	9		B	D		10.2	16.4
Danforth Avenue	114	RW-2-3	1005	150	0	0	2	7		C	C		9.3	9.3
Danforth Avenue	116	RW-2-1	1007	N/A	0	0	0	0	*	F	F		0.0	0.0
Danforth Avenue	120	RW-2-1*	1008	N/A	0	0	0	0	*	F	F		0.0	0.0
Danforth Avenue	120R	RW-2-6	1006	130	0	0	1	6		B	B		7.6	7.6
Danforth Avenue	124	RW-2-6	1006	160	0	0	1	6		B	B		9.2	9.2
Danforth Avenue	125	RW-2½-6	1006	120	0	0	1	6		B	B		7.1	7.1
Danforth Avenue	128	RW-2-6	1003	150	0	1	4	9		B	D		8.6	15.1
Danforth Avenue	129	AW-2½-1	1000	210	0	4	2	7		A	G	\$ 41,000	7.2	47.9
Danforth Avenue	132	RW-2-6*	1000	140	0	4	7	12		B	G	25,000	8.1	28.1
Daniels Avenue	167	RW-2-1	1004	130	0	0	0	3		F	A		0.0	4.6
Daniels Avenue	168	RW-2-2	1008	190	0	0	0	4		F	B		0.0	10.7
Daniels Avenue	173	RW-2-1	1003	140	0	1	0	4		F	D		0.0	14.7
Daniel's Ave.Ext.	3	RW-2-6	999	100	0	5	8	13		B	G	13,000	6.2	14.6

W. Branch

TABLE I

REACH NO. 4

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Daniels Ave. Ext.	5	RW-2-2	999	110	0	5	8	13		B	G	\$ 15,000	6.6	16.9
Dewey Avenue	233	RW-2-6	1005	130	0	0	2	7		B	B		7.6	7.6
Dewey Avenue	237	RW-2-6	1004	130	0	0	3	8		B	B		7.6	7.6
Dewey Avenue	245	RW-2-6	1004	130	0	0	3	8		B	B		7.6	7.6
Dewey Avenue	247-249	AW-2-1	1005	140	0	0	0	2		F	A		0.0	4.9
Dewey Avenue	253	RW-2-1	1005	160	0	0	0	2		F	A		0.0	5.5
Dewey Avenue	257	RW-2-6	1006	150	0	0	1	6		B	B		8.6	8.6
Dewey Avenue	261	RW-2-2	1008	150	0	0	0	4		F	B		0.0	8.6
Dewey Avenue	265	RW-2-1	1004	140	0	0	0	3		F	A		0.0	4.9
Dewey Avenue	271	AW-2-1	1001	150	0	3	1	6		F	D		0.0	15.1
Dewey Avenue	272	CB-1-6	1006	210	0	0	1	6		B	B		11.8	11.8
Dewey Avenue	275	RW-2-2	1000	100	0	4	7	12		B	G	13,000	6.2	14.6
Dewey Avenue	284	RW-2-6	1005	130	0	0	2	7		B	B		7.6	7.6
Dewey Avenue	285	RW-2-6	1000	120	0	4	7	12		B	G	18,000	7.1	20.3
Dewey Avenue	287	RW-2-6	1000	170	0	4	7	12		B	G	36,000	9.6	40.5

W. Branch

TABLE I

REACH NO. 4

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Dewey Avenue	291	RW-2-1	999	120	0	5	3	8		A	G	\$ 18,000	4.2	21.3
Elm Vale Place	7	RW-2-6	1005	150	0	0	2	7		B	B		8.6	8.6
Elm Vale Place	11	RW-2-3	1005	110	0	0	2	7		C	C		7.2	7.2
Elm Vale Place	15	RW-2-3	1005	110	0	0	2	7		C	C		7.2	7.2
Elm Vale Place	19	RW-2-6	1005	130	0	0	2	7		B	B		7.6	7.6
Elm Vale Place	24	RW-2-6	1006	170	0	0	1	6		B	B		9.6	9.6
Fahey Beverage Company Elm Vale Place	39	CM-2-0	1002	580	0	2	0	2	17	F	E		0.0	110.0
J. B. Paper Company Elm Vale Place	--	CB-2-0	1002	975	0	2	0	2	18	F	E		0.0	16.0
Francis Avenue	282	RW-2-6	1004	160	0	0	3	8		B	B		9.2	9.2
Francis Avenue	283	RW-2-2	1004	175	0	0	3	8		B	B		9.9	9.9
Francis Avenue	286	RW-2-2	1002	120	0	2	5	10		B	D		7.1	13.8
Francis Avenue	297- 299	AW-2-6	1002	170	0	2	5	10		B	D		9.6	16.0
Francis Avenue	301- 303	AW-2-6	1002	180	0	2	5	10		B	D		10.2	16.4

W. Branch

TABLE I

REACH NO. 4

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
King Street	8	RW-2-2	1003	170	0	1	4	9		B	D		9.6	16.0
King Street	10-12	AW-2-6	1001	225	0	3	6	11		B	D		12.7	18.0
King Street	16	RW-2-2	1003	160	0	1	4	9		B	D		9.2	15.6
King Street	20	RW-1½-6	1003	140	0	1	4	9		B	D		8.1	14.7
King Street	24	RW-2-3	1004	150	0	0	3	8		C	C		9.3	9.3
King Street	32	RW-2-3	1006	150	0	0	1	6		C	C		9.3	9.3
King Street	40	RB-2½-2	1006	140	0	0	1	6		B	B		8.1	8.1
King Street	44-46	AW-2-2	1005	160	0	0	2	7		B	B		9.2	9.2
King Street	48-50	AW-2-6	1004	160	0	0	3	8		B	B		9.2	9.2
King Street	53	RB-2-2	1008	160	0	0	0	4		F	B		0.0	9.2
King Street	54-56	AW-2-2	1003	180	0	1	4	9		B	D		10.2	16.4
King Street	60	RW-2-3	1002	130	0	2	5	10		C	D		8.2	14.3
King Street	64	RW-2-3	1002	110	0	2	5	10		C	D		7.2	13.4
King Street	65	RW-2½-6	1008	150	0	0	0	4		F	B		0.0	8.6
King Street	77	RW-2-2	1008	120	0	0	0	4		F	B		0.0	7.1
King Street	81	RW-2½-2	1007	160	0	0	0	5		F	B		0.0	9.2

W. Branch														
TABLE I														
REACH NO. 4														
STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
King Street	87	RW-2½-2	1006	160	0	0	1	6		B	B		9.2	9.2
King Street	91	RW-2-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0
King Street	101	RW-1-5	1006	120	0	0	1	6		C	C		7.6	7.6
King Street	107	RW-2-0	1005	N/A	0	0	0	0	*	F	F		0.0	0.0
King Street	115	RW-1-0	1005	N/A	0	0	0	0	*	F	F		0.0	0.0
King Street	153	RW-2-0	1004	N/A	0	0	0	0	*	F	F		0.0	0.0
King Street	165	RW-2½-6	1004	130	0	0	3	8		B	B		7.6	7.6
King Street	169	RW-2-1	1007	N/A	0	0	0	0	*	F	F		0.0	0.0
King Street	173	RW-2½-6	1008	120	0	0	0	4		F	B		0.0	7.1
King Street	177	RW-2-1	1007	N/A	0	0	0	0	*	F	F		0.0	0.0
King Street	181	RW-2½-1	1007	N/A	0	0	0	0	*	F	F		0.0	0.0
King Street	189	RW-2-6	1009	120	0	0	0	3		F	B		0.0	7.1
King Street	193	RW-1-2	1012	N/A	0	0	0	0	*	F	F		0.0	0.0
Leidhold Place	7-9	AW-2½-6	1003	130	0	1	4	9		B	D		7.6	14.3
Leidhold Place	8	RW-2-1	1003	130	0	1	0	4		F	D		0.0	14.3

W. Branch

TABLE I

REACH NO. 4

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Leidhold Place	10	RW-2-6	1003	160	0	1	4	9		B	D		9.2	15.6
Leidhold Place	11	RW-2-0	1000	120	0	4	0	4		F	G	\$ 18,000	0.0	20.3
Leidhold Place	14	RW-2-0	1000	235	0	4	0	4		F	G	52,000	0.0	60.6
Lenox Avenue	10	RW-2-2	1005	220	0	0	2	7		B	B		12.4	12.4
Bob's Automotive Linden Street	--	CB-1-0	997	130	2	7	2	7	19	E	G	16,000	17.6	17.6
Linden Street	202-204	AW-2-1	1000	210	0	4	2	7		A	G	28,000	7.2	34.9
Linden Street	206-208	AW-2-6	1003	180	0	1	4	9		B	D		10.2	16.4
Linden Street	218	RW-2-6	1008	160	0	0	0	4		F	B		0.0	9.2
Cemetery Office Off Wahconah Street		CW-2-0	1003	180	0	1	0	1	20	F	E		0.0	2.0
Cemetery Chapel Off Wahconah Street		CB-2-0	1001	220	0	3	0	3	21	F	E		0.0	3.0
Cemetery Garage Off Wahconah Street		CB-2-0	1001	210	0	3	0	3	22	F	E		0.0	0.0
Body Shop Park Street	52	CB-1-0	1001	290	0	3	0	3	23	F	E	45,000	0.0	54.0

W. Branch

TABLE I

REACH NO. 4

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Park Street	53	RW-2-2	1004	110	0	0	3	8		B	B		6.6	6.6
Haddad Rug Company Park Street	56	CB-2-6	1001	360	0	3	6	11	24	B	E		20.4	19.0
Park Street	57	RW-2-6	1000	140	0	4	7	12		B	G	\$ 25,000	8.1	28.1
Park Street	77	CW-1-0	994	380	5	10	5	10		G	G	84,000	92.4	92.4
Seymour Street	112	AW-2-2	1012	N/A	0	0	0	0	*	F	F		0.0	0.0
Friendship Bar Seymour Street	117	CW-2-6	1006	290	0	0	1	6		B	B		16.4	16.4
Seymour Street	118- 120	AW-2-6	1008	190	0	0	0	4		F	B		0.0	10.7
Seymour Street	121- 123	AW-2-6	1006	184	0	0	1	6		B	B		10.4	10.4
Seymour Street	125- 127	AW-2-6	1005	194	0	0	2	7		B	B		11.0	11.0
Church of the Holy Family Rectory Seymour Street	993BF 133	CB-2-2	1003	240	0	1	6	11	25	B	E		13.5	30.0
Church of the Holy Family Seymour Street	---	CB-1-2	1010	300	0	0	0	4	25	F	E		0.0	75.0
Boston Fish Market Seymour Street	159	CB-2-6	1001	350	0	3	6	11	26	B	E		19.8	24.0
Richmond Bakery Seymour Street	161	CB-2-0	999	380	0	5	0	5		F	G	90,000	0.0	112.6
Turner Avenue	9- 11	AW-2-6*	1006	180	0	0	1	6		B	B		10.2	10.2

W. Branch

TABLE I

REACH NO. 4

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Turner Avenue	10	RW-2-2	1006	160	0	0	1	6		B	B		9.2	9.2
Turner Avenue	12	RW-2-2	1003	170	0	1	4	9		B	D		9.6	16.0
Turner Avenue	20	RW-1-1	996	190	3	8	6	11		D	G	\$ 34,000	16.7	37.4
Turner Avenue	21-23	AW-2½-6*	996	190	3	8	11	16		D	G	13,000	16.7	20.1
Turner Avenue	25-27	AW-2½-6*	996	190	3	8	11	16		D	G	13,000	16.7	20.1
Turner Avenue	31	RB-2-0	994	180	5	10	5	10		G	G	20,000	25.1	25.1
Turner Avenue	64	RW-2-2	999	140	0	5	8	13		B	G	25,000	8.1	28.1
Turner Avenue	72	RW-2-1	998	100	1	6	4	9		D	G	17,000	13.0	18.6
Turner Avenue	76	RW-2-1	998	100	1	6	4	9		D	G	17,000	13.0	18.6
Turner Avenue	82	RW-2-1	998	100	1	6	4	9		D	G	17,000	13.0	18.6
Turner Avenue	86	RW-2-1	998	100	1	6	4	9		D	G	17,000	13.0	18.6
Turner Avenue	89	RW-2-6	999	160	0	5	8	13		B	G	32,000	9.2	36.0
Turner Avenue	90	RW-2-1	998	110	1	6	4	9		D	G	15,000	13.4	16.9
Turner Avenue	91	RW-2-2	999	130	0	5	8	13		B	G	21,000	7.6	23.6
Turner Avenue	92	RW-1½-6	998	130	1	6	9	14		D	G	21,000	14.3	22.5
Turner Avenue	93	RW-2-2	999	130	0	5	8	13		B	G	21,000	7.6	23.6

W. Branch

TABLE I

REACH NO. 4

STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Turner Avenue	94	RW-2-6	998	170	1	6	9	14		D	G	\$ 27,000	16.0	31.5
Turner Avenue	95	RW-2-2	999	160	0	5	8	13		B	G	24,000	9.2	28.0
Church Wahconah Street	76	CW-2-2	1008	143	0	0	0	4		F	B		0.0	8.3
Wahconah Street	82	RW-2-2	1003	160	0	1	4	9		B	D		9.2	15.6
Dick's Variery Wahconah Street	85	CW-2-6	1002	180	0	2	5	10		B	D		10.2	16.4
Wahconah Street	88	RW-2-2	1004	150	0	0	3	8		B	B		8.6	8.6
Jerry's Cafe Wahconah Street	89	CB-1-0	1001	190	0	3	0	3	27	F	E	19,000	0.0	22.4
Wahconah Street	93-95-99	AW-2-6	1005	230	0	0	2	7		B	B		13.0	13.0
Wahconah Street	105-109	CB-2-0	1003	230	0	1	0	1	28	F	E		0.0	4.0
Wahconah Street	115-123	CB-1-0	1000	340	0	4	0	4		F	G	72,000	0.0	82.8
Vale Florists - Greenhouse Attached Wahconah Street	120	CW-1-0	1001	390	0	3	0	3	29	F	E		0.0	8.0
Wahconah Street	126-128	AW-2-2	1004	210	0	0	3	8		B	B		11.8	11.8
Wahconah Street	127-133	CW-1-0	999	320	0	5	0	5		F	G	64,000	0.0	73.6
Wahconah Street	132-136	AW-2-6	1004	250	0	0	3	8		B	B		14.1	14.1
Stadium Wahconah Street	---	CM-1-0	994	N/A	5	10	5	10	30	E	E		0.0	0.0

W. Branch														
TABLE I														
REACH NO. 4														
STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S	
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.
Wahconah Street	139	RW-2-6	1002	120	0	2	5	10		B	D		7.1	13.8
LaCocina Restaurant, 1st floor														
Wahconah Street	140	AW-3-0	1003	160	0	1	0	1	31	F	E		0.0	2.0
Wahconah Street	144-146	AW-2-6	1008	210	0	0	0	4		F	B		0.0	11.8
Adrien's Diner														
Wahconah Street	145	CB-1-0	1003	170	0	1	0	1	32	F	E		0.0	14.0
Wahconah Street	150-152	AW-2-6	1008	190	0	0	0	4		F	B		0.0	10.7
Wahconah Street	151	RW-2-2	1005	190	0	0	2	7		B	B		10.7	10.7
Wahconah Street	153-155	AW-2-6	1005	170	0	0	2	7		B	B		9.6	9.6
Wahconah Street	157	RW-2-6	1006	200	0	0	1	6		B	B		11.3	11.3
(Attached to 157)														
Wahconah Street	161	CB-1-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0
Wahconah Street	163	RW-2-6	1006	140	0	0	1	6		B	B		8.1	8.1
Wahconah Street	169	CW-1-0	1004	N/A	0	0	0	0	*	F	F		0.0	0.0
Wahconah Street	169R	RW-2-2	1000	100	0	4	7	12		B	G	\$ 25,000	6.2	26.6
Closed Gas Station														
Wahconah Street	180	CB-1-0	1004	N/A	0	0	0	0	*	F	F		0.0	0.0
Shea's Rugs														
Wahconah Street	---	CW-1-0	1007	N/A	0	0	0	0	*	F	F		0.0	0.0
Wahconah Street	187	AB-2-6	1002	200	0	2	5	10	33	B	E		11.3	3.0
Liquor Store, same building as Nichols Pharmacy														
Wahconah Street	---	CB-1-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0

TABLE I

REACH NO. 4

W. Branch														REACH NO. 4	
STREET	HOUSE NO	TYPE	ESTIMATED F.F. ELEVATION	ESTIMATED PERIMETER LF	DEPTH OF WATER ABOVE F.F.		DEPTH OF INUNDATION		FOOTNOTE #	PROPOSED FLOOD PROOF TECHNIQUE		ESTIMATED MARKET VALUE	COST IN \$1000.00'S		
					100 YR	S.P.F.	100 YR	S.P.F.		100 YR	S.P.F.		100 YR	S.P.F.	
Nichols Pharmacy Wahconah Street	----	CB-2-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0	
Wahconah Street	210-218	AW-2-6	1003	320	0	1	4	9		B	D		18.0	24.0	
Wahconah Street	224	AW-2-6	1003	240	0	1	4	9		B	D		13.5	18.0	
Wahconah Street	224R	AW-2-6	1003	200	0	1	4	9		B	D		11.3	17.1	
Wahconah Street	225	RW-2-6	1003	200	0	1	4	9		B	D		11.3	17.1	
Wahconah Street	225R	RW-2-6	1003	200	0	1	4	9		B	D		11.3	17.1	
Wahconah Street	234	CW-2-6*	1004	220	0	0	3	8		B	B		12.4	12.4	
Wahconah Street	235	RW-2-0	1004	N/A	0	0	0	0	*	F	F		0.0	0.0	
Wahconah Street	237	AW-2-6	1005	160	0	0	2	7		B	B		9.2	9.2	
Wahconah Street	239	CB-2-0	1005	N/A	0	0	0	0	*	F	F		0.0	0.0	
Wahconah Street	240	RW-2½-6	1007	200	0	0	0	5		F	B		0.0	11.3	
Wahconah Street	242-244	AW-2-6	1006	140	0	0	1	6		B	B		8.1	8.1	
Wahconah Street	248	AW-2-6	1005	160	0	0	2	7		B	B		9.2	9.2	
Wahconah Street	252	CB-1-0	1005	N/A	0	0	0	0	*	F	F		0.0	0.0	
Wahconah Street	256	RW-2-6	1006	170	0	0	1	6		B	B		9.6	9.6	
Apt. Complex Wahconah Street	----	AW-2-0	1006	N/A	0	0	0	0	*	F	F		0.0	0.0	

TABLE II

							SIZE IN PERIMETER FEET					FLOODPROOFING METHOD													
REACH NUMBER	# OF STRUC. STUDIED	# OF RESIDENCES	# OF COMMERCIAL	# OF APARTMENTS	# OF INDUSTRIAL	0 - 76	77 - 120	125 - 170	OVER 171	N/A	A		B		C		D		E		F		G		
											100 YR	SPF	100 YR	SPF	100 YR	SPF	100 YR	SPF	100 YR	SPF	100 YR	SPF	100 YR	SPF	
S.W. BRANCH	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0		
	2	71	54	13	4	0	1	36	24	10	0	1	0	10	8	8	3	7	4	11	11	9	0	25	45
		72	55	13	4	0	1	36	25	10	0	1	0	10	8	8	3	7	5	11	11	10	0	25	45
WEST BRANCH	1	7	0	1	6	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7	7	0	0	
	2	10	8	1	1	0	0	3	6	1	0	0	0	4	2	2	4	0	2	0	1	3	0	1	1
	3	100	62	11	27	0	0	13	49	31	7	9	2	44	28	1	1	19	34	2	4	23	7	2	24
	4	178	107	33	38	0	0	27	74	55	22	2	4	87	55	10	7	14	33	3	18	60	21	2	40
		295	177	46	72	0	0	43	129	87	36	11	6	135	85	13	12	33	69	5	23	93	35	5	65
TOTALS		367	232	59	76	0	1	79	154	97	36	12	6	145	93	21	15	40	74	16	34	103	35	30	110

TABLE III
FLOODPROOFING COSTS

FLOODPROOFING TECHNIQUE							
(PERIMETER FT.) SIZE	(DOLLARS PER PERIMETER FT.)			(LUMP SUM COST IN THOUSAND DOLLARS)			
	A	B	C	D	E	F	G
0 - 76	37	64	71	12	Individual case for each	0	Individual case for each
77 - 124	35	59	63	14		0	
125 - 170	34	57	61	16		0	
≥ 171	35	56	61	18		0	

TABLE IV

FLOODPROOFING COST ACCORDING TO REACH

	REACH NUMBER	NUMBER OF CASES (A, B, C, D, E*, G)		COST IN THOUSANDS OF DOLLARS	
		<u>100 YEAR</u>	<u>SPF</u>	<u>100 YEAR</u>	<u>SPF</u>
S.W. BRANCH	1	0	1	0.0	15.6
	2	62	71	5118.1	5816.7
WEST BRANCH	1	0	0	0.0	0.0
	2	7	10	60.1	109.7
	3	77	93	1017.4	1599.3
	4	117	156	1290.8	2798.9
	TOTALS	263	331	7486.4	10340.2

* EXCLUDING THE STADIUM OFF WAHCONAH STREET (NO COST INVOLVED)

TABLE V

FLOODPROOFING COSTS ACCORDING TO CATEGORY

CATEGORY	# OF CASES		COST IN THOUSANDS		AVERAGE COST PER CASE IN THOUSANDS	
	100 YEAR	SPF	100 YEAR	SPF	100 YEAR	SPF
RESIDENTIAL	181	218	2306.7	3932.0	12.74	18.04
COMMERCIAL	29	48	4569.6	5361.0	157.57	111.69
APARTMENT	53	65	610.1	1047.2	11.51	16.11
INDUSTRIAL	<u>0</u>	<u>0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
TOTALS	263	331	7486.4	10340.2	28.47	31.17

III. CONCLUSIONS

Included within Table IV is a summary of floodproofing costs for the entire study area according to Branch and Reach Number. This report estimates a project cost of approximately 7.5 million dollars (\$7,500,000) for the 100 Year Flood levels and 10.3 million dollars (\$10,300,000) for the Standard Project Flood levels.

A review of Table V indicates that residential property constitutes the largest portion of the total project cost impact for both flood levels studied. However, the financial impact to the commercial properties (and to the City of Pittsfield) as shown in Table V is much more difficult to estimate as part of the true cost of non-structural flood damage prevention. This report did not attempt to estimate the costs of acquiring businesses for structures found to be impossible to floodproof and therefore assumed to require demolition; the cost and availability of commercial property to relocate those businesses; or the practicality of relocating a commercial business with its viability dependent upon location.

In reviewing Table I, Table II and Appendix B (pages 33 - 38), the impact of the demolition category upon the total project estimate can be analyzed. Of the 72 structures in the Southwest Branch, 35 structures under the 100 year flood and 55 under the SPF are categorized as requiring demolition. This represents 49 and 76 percent of all structures in this branch respectively. However, from the project cost

standpoint, under the 100 year flood, \$4,860,300 (95%) of the total estimated floodproofing cost of \$5,118,100 for the Southwest Branch is attributable to demolition; and under the SPF, \$5,650,500 (97%) of the total amount of \$5,816,700 is attributable to demolition. Should a project of this scope be implemented along the Southwest Branch of the Housatonic River, the impact of demolition upon the community in this area would be extremely significant, both physically and financially.

In the West Branch area surveyed for this report, the impact of demolition upon the total estimated floodproofing cost is not as significant. Of the 295 structures in the West Branch, only 9 under the 100 year flood and 71 under the SPF (3% and 24% of all structures in this Branch respectively) fall under the demolition category. From an estimated floodproofing cost standpoint, \$422,800 (18%) of the \$2,368,300 total estimated floodproofing cost for this Branch under the 100 year flood and \$2,160,400 (48%) of the total \$4,507,900 under the SPF is attributable to demolition. This too, represents a significant impact, but not to the extent seen in the Southwest Branch area.

Several major estimates and assumptions were made within this study which may have a large effect upon the actual final project cost should such a project be instituted. The following represents some of these estimations and assumptions made during this study:

A. The study areas of this report are limited solely to the areas delineated for the 100 year and the SPF flood levels as shown on Sheets 1 - 4 in the Attachments.

B. It was assumed that wooden structures being inundated above the first floor elevation from one to three feet could be raised (this could only be verified after an in-depth structural analysis of the building). Structures falling in this category would be floodproofed using Technique C in combination with sealing the doors and windows in the foundation wall. This assumption may not be in accordance with local fire codes or the owner's wishes. Alternate floodproofing techniques may prove more expensive than the above method.

Structures, primarily commercial, being inundated above the first floor elevation from one to three feet were reviewed on a case by case basis. It is impractical to assume that a masonry structure, generally constructed on a slab, could be raised. Therefore, each structure was reviewed to see if an alternate method of floodproofing would be possible, such as placing shields over windows or construction of earth berms. If no practical solutions were apparent, an estimated cost for demolition of the structure was made and entered in Table I.

C. Structures which had a depth of inundation in excess of three feet above the first floor were assumed to require demolition. Further analysis of the structures and additional cost studies would be required to evaluate if the structure could physically be relocated and if vacant property would be available.

D. A factor which affects a large number of structures within this study is the item involving the waterproofing of the outside of basement walls. For this investigation, it was assumed that all structures in fair to excellent condition have finished basements with storage. In many cases, the basement walls may actually be unfinished rough concrete. A savings may be seen by the elimination of the outside trench should it be determined that such structures could be waterproofed from the inside. It may also be found that the proposed trench excavation may not be possible without affecting the structural integrity of the building. This could be due to the nature of the material making up the foundation, the overall condition of the foundation or the layout of the foundation which may prevent access. Should such a situation occur, the final solution may cost much more than the estimated cost herein.

E. Another factor which could have the largest effect upon the success of the non-structural project is the cooperation of the people who would be affected. Should these people offer little or no cooperation, the projected implementation time would be increased and new solutions may have to be sought. Such actions would change the project costs significantly.

F. Although costs have been estimated in Table I for the fair market value of apartments falling in the demolition category, no attempt was made to estimate the subsequent costs of relocating the tenants of those apartments to new living quarters. Such costs are difficult to estimate

and would result in an actual cost for apartments requiring demolition somewhat higher than presented in the scope of this report.

APPENDIX A

APPENDIX A

- * (NOTE: Structures classified under this footnote were included in the field survey as appearing to fall within the flood plain limits, but field reconnaissance showed them to be above SPF inundation. They appear herein only to show that consideration was given to them.

SOUTHWEST BRANCH

1. 112 Jackson Street - Radio Station WBEC

This modern building is a one story concrete block office building and radio station constructed as a slab-on-grade with a drainage ditch running parallel to the rear of the building.

At the 100 year storm, this structure would be subject to two feet of inundation and an additional seven feet under the SPF.

It is proposed, for purposes of this study, to provide a dike around the station itself, but not the towers. Storm drainage contained within the area enclosed by the dike could be removed by collecting and pumping the drainage to the exterior of the dike limits. Vehicular access would be required up and over the dike to the radio towers. The cost of this work is estimated to be \$21,000 for the 100 year storm and \$32,000 for the SPF.

2. Big "N" Mall Complex - W. Housatonic Street

This complex is a slab-on-grade, concrete block structure, with a glass front. Under the 100 year storm, it would be inundated by eight feet, and under the SPF, an additional seven feet.

Consideration was given to providing a dike around the area, however, it is our opinion that a dike would render this complex economically undesirable to any potential tenant. It is presently occupied to less than twenty percent of its total floor area. Since it is physically impossible to floodproof or raise this complex, it is included for demolition.

3. MacDonald's Hamburger Stand - W. Housatonic Street

This structure is a new, standard structure normal for this franchise. It is constructed within the present flood plain. Under the 100 year storm, it would be inundated by eleven feet of water, and under the SPF, by an additional seven feet.

For purposes of this study, this complex is included for demolition.

4. Fitch's Complex - 472-484 W. Housatonic Street

This complex consists of a twenty-two unit motel, owner's home at 472 W. Housatonic Street, Shell Gas Station and repair shop at 484 W. Housatonic Street, and a diner which is not numbered. All are subject to flooding of eleven feet under the 100 year flood and an additional seven feet under the SPF.

Since it is physically impossible to floodproof or raise these structures, this complex is included for demolition.

5. Sunoco Station - W. Housatonic Street

This structure is slab-on-grade, concrete block building with a seven bay general repair garage being an integral part of the business. Under the 100 year flood, it would be inundated by twelve feet of water, and by the SPF, an additional seven feet.

For purposes of this study, this building is included for demolition.

6. 581 W. Housatonic Street - Mobil Gas Station

This structure is of concrete block construction with a two bay garage as an integral part of the structure.

Under the 100 year storm, it would be inundated by five feet, and by an additional seven feet under the SPF. Since it is physically impossible to floodproof or raise this structure, it is included in the demolition category.

7. 607 W. Housatonic Street - Body Shop

This structure consists of three combined buildings which are of slab-on-grade and concrete block construction.

Inundations and recommendations are as under Footnote 6 above.

8. 615 W. Housatonic Street - Tire Shop

This structure is a slab-on-grade, concrete block structure with a four bay garage.

Under the 100 year storm, it would be inundated by four feet, and under the SPF, an additional seven feet. Since it is physically impossible to floodproof or raise this structure, it is included for demolition.

WEST BRANCH

9. 301 Columbus Avenue - Riverside Cafe

This two story brick structure situated adjacent to the Housatonic River would be inundated by four feet under the 100 year flood, and by an additional six feet under the SPF. The SPF flood would inundate the first floor of this structure by two feet.

Due to the condition of this structure's foundation and the physical characteristics of the building, waterproofing the basement and raising the foundation are not feasible. Thus, this structure is included in the demolition category under the SPF.

10. 300 Columbus Avenue - West Side Fish Market

This one story commercial structure is constructed of concrete block on a slab-on-grade and would be subject to three feet of inundation under the SPF.

Due to the physical characteristics of this building, raising the foundation is not feasible. Thus, for the purposes of this study, it is included in the demolition category for the SPF.

11. 97 Dewey Avenue - Milton's Place

This structure is concrete block, slab-on-grade. At both 100 year storm and SPF, this structure would experience flooding. Due to its construction, raising this structure is not feasible. Thus, for purposes of this study, it is included under demolition.

12. 154 Dewey Avenue

This building is a two story brick building on a slab-on-grade and would be subject to three feet of inundation at SPF. Since it is physically impossible to raise this structure without damage, it would be necessary to install flood shields along the front and to apply waterproofing to the level of the SPF. This work would cost approximately \$5,000.

13. 175 Dewey Avenue

The major portion of this two story residence is constructed of concrete block, but the rear section is wood frame slab-on-grade. Under the SPF, this structure would be subject to two feet of inundation.

Due to the size and characteristics of this structure, raising its foundation is not feasible. Thus, for purposes of this study, it is included under demolition for the SPF.

14. 198 Linden Street - Amoco Gas Station

This concrete block, slab-on-grade, two bay and office service station is subject to flooding at both the 100 year flood and the SPF. Due to its construction, raising the structure for the 100 year flood is not feasible. Therefore, demolition is included for both flood levels.

15. 50 Danforth Avenue

This home is constructed with brick facing and fieldstone around its entry on a slab-on-grade.

At SPF this structure would be subject to three feet of inundation. As this building would be severely damaged by any attempt to raise it, and demolition is impractical for purposes of this study, this residence would be provided with removable flashboards at the two doors and water-proofing to the underside of windows.

The cost of the flood shields is estimated at \$1,100.

16. 82 Danforth Avenue

This structure is a two story wood frame residence constructed on a slab-on-grade. Under the 100 year storm it would be subject to three feet of inundation, and an additional five feet under the SPF.

Due to the construction of the building, raising the foundation is not feasible. Therefore, for the purposes of this study, it is included in the demolition category under both the 100 year storm and the SPF.

17. 39 Elm Vale Place - Fahey Beverage Company

This new steel panel clad, one story warehouse type structure has a slab-on-grade with a two bay truck dock being an integral part of the building. The truck approach area is four feet below finished floor.

This facility is subject to theoretical flooding under the SPF. For purposes of this study, we include the cost of raising the structure above this level and the reconstruction of the base slab to accommodate this raised structure.

The estimated cost for this work is \$110,000.

18. Elm Vale Place - J.B. Paper Company

This complex consists of five buildings, four of which are interconnected and constitute the smaller of the two structures shown on the plan. All structures are brick constructed on a slab-on-grade and would be subject to flooding under the SPF. On the west side of the building is a three bay and a two bay truck dock as well as miscellaneous access doors. Steel casement windows are three feet above finished floor.

Protecting these structures against flooding would require the installation of flashboards at all doors and the floodproofing of all exterior walls up to the underside of the windows.

The estimated cost for the above flood protection is \$16,000.

19. Linden Street - Bob's Automotive

This structure is a one story commercial building constructed of concrete block on a slab-on-grade. Under the 100 year storm it would be subject to two feet of inundation, and subject to an additional five feet of inundation under the SPF.

Since it is physically impossible to raise this structure without causing damage, it is included in the demolition category under the 100 year storm.

20. Off Wahconah Street - Cemetery Office

This two story building is constructed of brick, and set on a slab-on-grade. It would be subject to one foot of inundation under the SPF.

Due to the excellent state of repair and usage of this structure, it is placed in the category of being floodproofed by the use of waterproofing and flood shields.

The cost of this work is estimated at \$2,000.

21. Off Wahconah Street - Cemetery Chapel

This structure is constructed of granite blocks set on a slab-on-grade. It would be subject to three feet of inundation under the SPF.

Due to the excellent condition and nature of this structure, it is included in the waterproofing and flood shield category.

The cost of the floodproofing work is estimated at \$3,000.

22. Off Wahconah Street - Cemetery Garage

This is a two story brick structure constructed on a slab-on-grade. It would be subject to three feet of inundation under the SPF.

Due to the nature of this structure, it is included in the category of requiring no formal technique of floodproofing, since floodwaters could enter and recede from the garage while causing minimal damage.

23. 52 Park Street - Keene Body Shop

This building is made up of a brick portion and two distinct buildings of wood, all being interconnected. All are a slab-on-grade.

Under the SPF, this structure would be subject to three feet of inundation. Since it is physically impossible to raise these buildings or to provide a dike, for purposes of this study this complex is included for demolition.

24. 56 Park Street - Haddad Rug Company

This building, with basement, is a two story brick structure which would be subject to three feet of inundation above the first floor under the SPF. The basement, for both storms, would be subject to flooding. The floodproofing for this structure would be to install removable flood shields at the entrances and the basement windows, and to utilize the floodproofing technique presented in Table I.

The cost for the flood shields is estimated at \$19,000.

25. 133 Seymour Street - Church of the Holy Family & Rectory

The church and attached rectory are one structure of substantial brick construction on a concrete foundation with differing first floor elevations. The basement of the rectory would be subject to flooding under both the 100 year storm and SPF, but the church itself would be subject to inundation of the basement only under the SPF.

Due to the size, physical characteristics and nature of the structure, floodproofing measures considered include an interior drain and sump pump system and removable flood shields covering all openings to one foot above the SPF level.

The estimated cost of these floodproofing measures is approximately \$105,000; not including costs for backflow prevention through building drains and sanitary waste lines.

26. 159 Seymour Street - Boston Fish Market

This building is a two story brick building in excellent condition. Since it is physically impossible to raise this structure without damage, it would be necessary to install flood shields at all entrances and to apply waterproofing to the level of the SPF. Cellar windows would be sealed with brick.

This work would cost approximately \$24,000.

27. 89 Wahconah Street - Jerry's Cafe

This is a two-story wood frame structure with an addition constructed of brick on a slab-on-grade which fronts the street. It would be subject to three feet of inundation under the SPF.

Since it is physically impossible to raise the foundation of this structure or floodproof the building without impairing its function, it is included in the demolition category under the SPF.

28. 105-109 Wahconah Street

This group of buildings is of concrete block construction set on a slab-on-grade. It would be subject to one foot of inundation under the SPF.

Floodproofing this structure would entail the application of waterproofing to the lower two feet of the exterior perimeter of the building and the installation of removable flood shields at all entrances.

The cost of this work is estimated at \$4,000.

29. 120 Wahconah Street - Vale Florists

This complex consists of six greenhouses, a connecting shed, and a sales and office building. The sales and office building is a slab-on-grade, one story wooden structure which could be raised, therefore costs have been included for raising this structure only, leaving the greenhouses to flood should a SPF occur. The greenhouses would be subject to three feet of inundation under the SPF.

The cost of this work is estimated at \$8,000.

30. Wahconah Street - Stadium

The structure of concern at this sports stadium is a one story metal-clad, slab-on-grade building at the sports field on the nearer side to Wahconah Street. It would be subject to five feet of inundation under the 100 year storm and ten feet under the SPF.

Due to the construction and function of this structure, it is included in the category of requiring no method of floodproofing considered in this report.

31. 140 Wahconah Street - La Cocina Restaurant (1st floor)

This structure is a three story wood frame apartment constructed on a slab-on-grade. It would be subject to one foot of inundation under the SPF.

Floodproofing this structure may be accomplished by the installation of an exterior-mounted steel flood shield on the building perimeter with demountable flood shields at all entrances.

The cost of these measures is estimated at \$2,000.

32. 145 Wahconah Street - Adrien's Diner

The front portion of this building is a dining car, the attached portion being of concrete block on an elevated slab-on-grade. It would be subject to one foot of inundation under the SPF.

The dining car portion could be raised to protect this structure against the SPF and the rear portion protected with removable flood shields at entrances and waterproofing applied to the lower two feet of exterior walls.

The cost of this work, including modifications to the interface between the two structures, is estimated at \$14,000.

33. 187 Wahconah Street

This structure is a two story brick apartment building in relatively good condition. It would be subject to two feet of inundation under the SPF. As this structure could not be raised without damage to its integrity, floodproofing measures would include providing floodproofing sealing basement windows and access, and the installation of flashboards as well as the waterproofing to the underside of the windows.

The cost of this work is estimated at \$3,000.

APPENDIX B

JOB NO. 79-142
 DATE 5/23/79
 BY R.K. BAILEY
 CH'D BY [Signature]



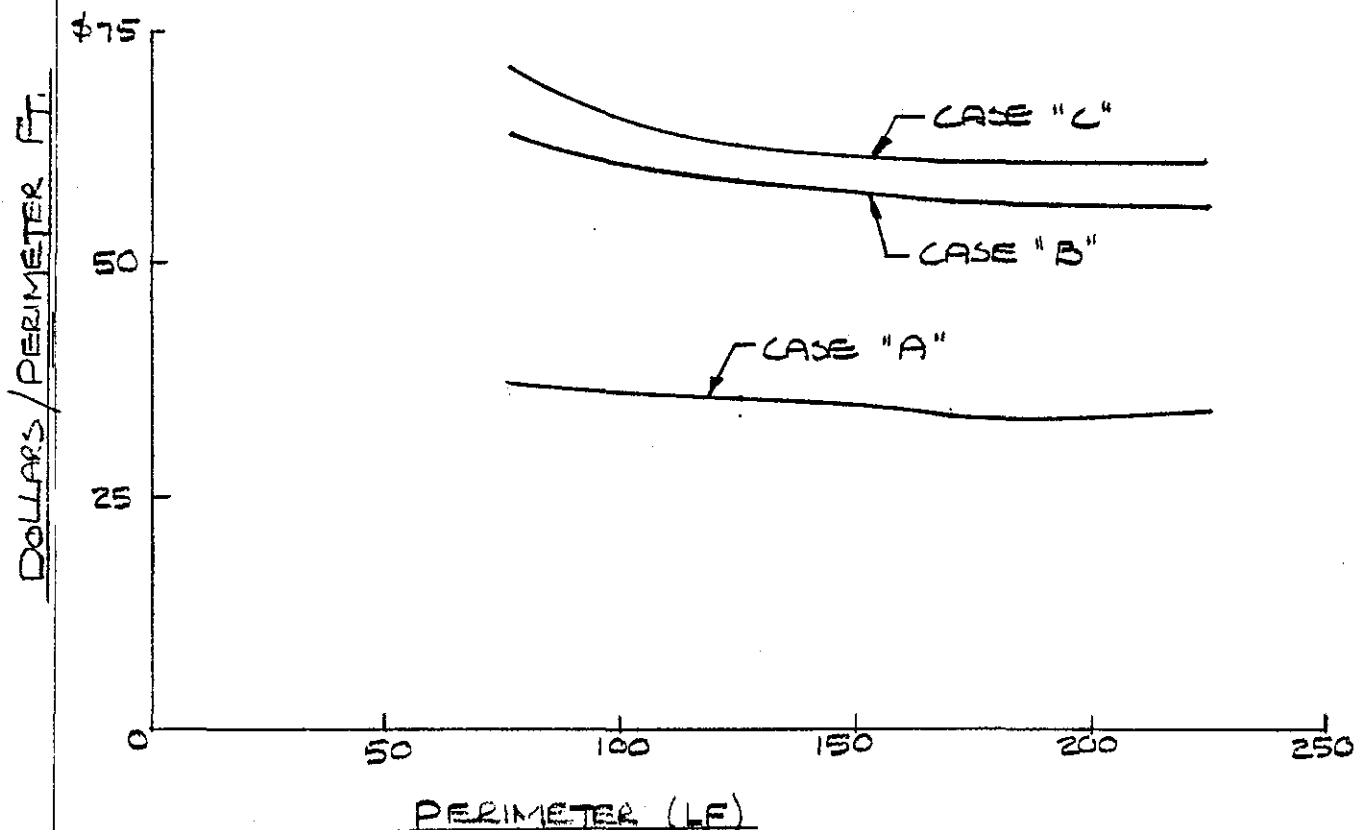
HAYDEN, HARDING & BUCHANAN, INC.
 CONSULTING ENGINEERS
 BOSTON, MASSACHUSETTS

SHEET NO. 1/20

JOB PITTSFIELD
 SUBJECT FLOOD STUDY
 CLIENT C.O.E.

COST FACTOR SUMMARY

HOUSE SIZE (LENGTH x WIDTH)	PERIMETER (LINEAR FEET)	FLOODPROOFING CATEGORY			
		DOLLARS/PERIMETER FT.			LUMP SUM
		A	B	C	D
18' x 20'	76	36.95	64.37	71.28	\$12,000
26' x 36'	124	35.27	58.83	63.06	14,000
35' x 50'	170	34.06	56.60	60.70	16,000
50' x 62'	224	34.66	56.35	61.03	18,000



JOB NO. 79-162 .1
DATE 5/21/79
BY R K Bailey
CHK'D BY J L STAU



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 2/38
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

(Wage Rates From "Means"-include G.H. & P.)

II. FLOODPROOFING - 26' x 36' HOME
(Perim = 124 feet)

A. DRAINS & SUMP PUMP

1. Breaking up slab around cellar floor
Rent air compressor @ \$50/day x 2 days \$ 100.
1 worker for 2 days: 16 hrs @ \$14.00/hr 224.
(Includes cleanup) \$ 324.

2. Hand excavate trench, remove mat'l
from cellar; load & haul away
Assume: 2 man crew @ \$31.50/hr
Trench 2'dp. x 2'wd @ base,
1/2 sides

$$\frac{1}{2} (4+2) 2 = 6 \text{ sq. ft.}$$

Inside perim. 2' from wall: 108'

$$\text{Volume} = \frac{648}{27} = 24 \text{ cy.}$$

Assume: 2 laborers can dig 12 cy/day
2 " " move 24 cy/day

- 2 days digging @ \$31.50/crew x 8 hrs/day \$ 504.
1 day loading @ \$31.50/crew x 8 hrs/day 252.

Dump Truck (6 cy) @ \$135/day 135.
Pay loader: 4 hrs @ \$34/hr 136.
\$ 1,027.

3. Backfill - crushed stone
24 cy. @ \$6/cy. (mat'l) \$ 144.
5 hrs labor @ \$14.00/hr 117.
\$ 261

JOB NO. 79-162.1
DATE 5/21/79
BY R K Gabley
CH'D BY J. LISTON



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 3/38
JOB PITTSFIELD
SUBJECT Flood Damaging
CLIENT C.O.E.

4. 6" V.C.P.
108 l.f. @ \$4 / l.f. (including installation) \$432.
5. Replacing Concrete
4' x 4 1/2 thk. x 108 l.f. / 27 =
5 1/3 c.y. @ \$110 / cy \$590
6. Sump Pump, hose, Install Outlet 275
7. Clean up, Replace tiles, etc.
8 hrs. @ \$14.60 / hr. 117.
- TOTAL \$3,036.

B. WATERPROOF WALLS

1. Excavate Trench Around House
Assume: 3.5' wd x 6' dp.
Outside perim: 140' (2' from wall)
Volume = $3.5 \times 6 \times 140 / 27 =$
109 cy @ \$2.80 / cy \$305.
2. Clean Walls, Apply Waterproofing
6' ht x 124' perim =
992 sf. @ \$1. / sf. 992.
3. Backfill Trench w/ Compaction
109 cy. @ \$3.60 / c.y. 392.
4. Restore Site (Clean up, Replace
Shrubs, Fences, etc.) 340.
- TOTAL \$2,029.
TOTAL IA & IB \$5,065.
B-3

JOB NO. 79-162.1
DATE 5/21/79
BY R.K. Bailey
CH'D BY J. C. Taylor



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 4/38
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

C. BLOCK UP WINDOWS

1. Remove Exist. Windows
Assume: 6 windows @ 2 hrs. labor/ea.
12 hrs. @ \$14.60/hr. \$175.
 2. Material - Concrete Blocks
6 windows x 16" x 32" / ea / 144 =
21 s.f. @ \$0.70/s.f. 15.
 3. Installation
Assume: 1 Bricklayer @ \$18.55/hr.
1 1/2 hrs x 6 x \$18.55 = \$167
Use Same As For Removal 175
- TOTAL \$365.

TOTAL	PART IA	:	\$3,036.
"	"	IB	2,029
"	"	IC	365

TOTAL PART I: \$5,430.

JOB NO. 75-1621
DATE 5/21/79
BY R. K. Bagley
CH'D BY John R. Bagley



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 5/34
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

II. RAISING FOUNDATION

A. EXISTING CELLAR - 2 story, 24'x34' ave home - 1' to 5'

1. Pipes & Electric Lines

Heating, sewer, water, gas, electric,
telephone etc. lines must be cut &
extended, junction boxes installed, etc.

L.S. Estimate \$1,700.

2. Underpinning - Jacking

Mobilization

\$700.

Estimate to cut walls, underpin, jack
up, place cribbing, etc.

Labor: 3 days - 2 mechanics, 3 laborers

Mechanics: \$21/hr x 3 x 8 x 2 1,008.

Laborers: \$14.60/hr x 3 x 8 x 3 1,051

Equipment Rental For Duration 1,200.

\$3,959

3. Masonry

Pour or lay new foundation, fix all
stairways, fix or pour new floor slab.

Assume:

- 3' foundation x 124' perim (new fdn.
walls) @ \$3.15/sf. \$1,116.

- Stairways & slab (Assume
1 mason & helper)

\$33.25 (combined)/hr x 2 days x 8 532

\$1,648.

JOB NO. 79-162.1
DATE 5/21/79
BY R.K. Beckley
H'D BY J. Ristay



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 6/38
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

4. Materials

Lines, pipes, brick/block/concrete, etc.
Estimate L.S. \$225.

5. Restoration

Clean up, shrubs, lawn, plaster cracked
walls, restore basement, repair
porches, etc. 1,150

6. Care for Occupants

Housing for duration, moving of
valuables, etc.

Assume:

30 day duration @ \$65 /day 1,950

TOTAL \$10,632.

TOTAL PART I : \$5,430.

TOTAL PART IIA : 10,632

TOTAL PARTS IA, IB, IC & IIA : \$16,062

JOB NO. 75-162.1
DATE 5/21/79
BY R.K. Barlow
CHK'D BY J. Ristau



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 7/39
JOB PITTSFIELD
SUBJECT Flood Damage
CLIENT C.O.E.

COSTS

CASE "A" - DRAINAGE SYSTEM WITH SUMP PUMP (See pp. 1 & 2, IA)

Raw Cost :	\$3,036. (pg. 2)
10% Contingencies :	<u>304.</u>
	\$3,340.
General Contractor's OH & P (10%) :	<u>304.</u>
	\$3,644.
Engineering & Survey (20%) :	<u>729.</u>
	\$4,373.

COST / PERIM. FT. = $\$4,373 / 124 = \$35.27 / \text{ft.}$

CASE "B" - DRAINAGE SYSTEM, SUMP PUMP & WATERPROOFING (See pg. 1 & 2, IA & IB)

Raw Cost :	\$5,065 (pg. 2)
10% Contingencies :	<u>507</u>
	\$5,572.
General Contractor's OH & P (10%) :	<u>507</u>
	\$6,079.
Engineering & Survey (20%) :	<u>1,216.</u>
	\$7,295.

COST / PERIM. FT. = $\$7,295 / 124 = \$58.83 / \text{ft.}$

JOB NO. 73-162.1
DATE 5/21/79
BY R.K. Baskin
CH'D BY J. LESTER



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 8/28
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

CASE "C" - DRAINAGE SYSTEM, SUMP PUMP,
WATERPROOFING & BLOCK UP WINDOWS
(See pp. 1-3: IA, IB & IC).

Raw Cost :	\$ 5,430. (pg. 3)
10% Contingencies :	<u>543.</u>
	\$ 5,973.
General Contractor OH & P (10%) :	<u>543.</u>
	\$ 6,516.
Engineering & Survey (20%) :	<u><u>1,303.</u></u>
	\$ 7,819.

COST / PERIM. FT. = $\$7,819 / 124 = \$63.06 / \text{ft.}$

CASE "D" - RAISE HOUSE 3 FEET.
(See pp 4-5, IIA).

Raw Cost :	\$ 10,632. (pg. 5)
10% Contingencies :	<u>1,063.</u>
	\$ 11,695.
General Contractor OH & P (10%) :	<u>1,063.</u>
	\$ 12,758
Engineering & Survey (10%) :	<u><u>1,276.</u></u>

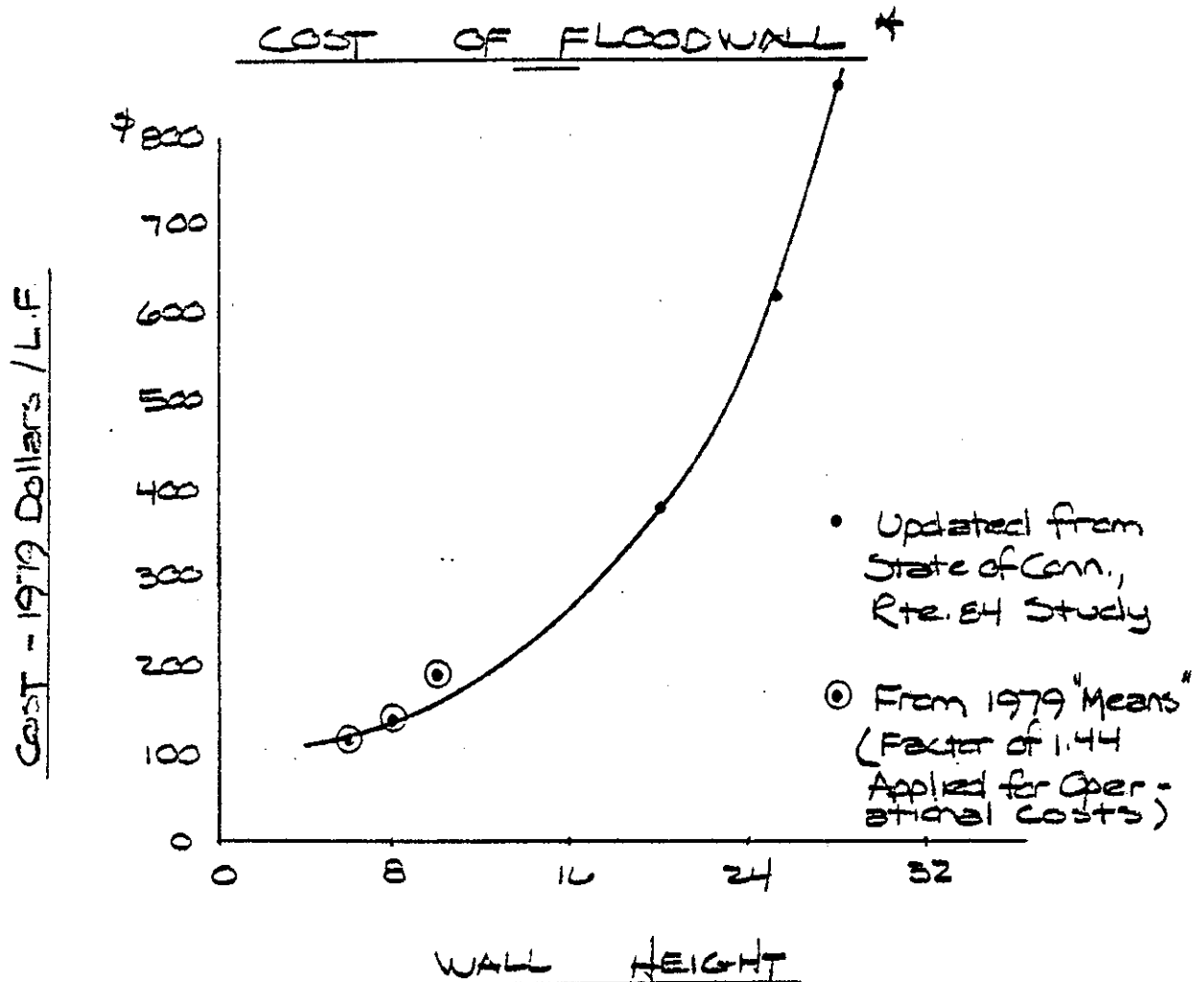
Lump Sum \longrightarrow \$ 14,034.

JOB NO. 79-162.1
DATE 5/22/79
BY R.K. Boyle
CH'D BY J. Ristay



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 9/38
JOB PITTSFIELD
SUBJECT Flood Wall
CLIENT C.O.E.



* Floodwall considered is reinforced concrete cantilever, including all materials, installation & operational extra's.

JOB NO. 79-162.1
DATE 5/22/79
BY R. K. Bailey
CHK'D BY J. [signature]



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 10/28
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

COST OF FLOOD SHIELDS

1. Material

Assume: $3' \times 3\frac{1}{2}'$ gate, $\frac{1}{4}"$ thk. aluminum shield

Volume: $3' \times 3\frac{1}{2}' \times \frac{1}{4}/12 = 0.22$ cf

Unit Wt.: 165 pcf

Total weight (Assume 2 x wt. of gate
for all brackets & fixtures)

$0.22 \text{ cf} \times 165 \text{ pcf} \times 2 =$

$72\# @ \$2.50/\text{lb.}$

\$180.

2. Installation

Assume: A crew of 1 mason & 1 helper can
install $1\frac{1}{2}$ shields/day, or approx.
time to install 1 shield = 6 hrs.

6 hrs @ $(\$16.55 + \$14.60)/\text{hr}$

199
\$379.

Raw Total:

\$379.

10% Contingencies:

38

Contractor's O&P (10%):

38

\$455.

Engineering (20%):

91

\$546.

USE \$550 / Shield

JOB NO. 70-1162.1
DATE 5/22/79
BY R.K. Baccig
CH'D BY J. L. FAL



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 11 / 23

JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

(Wage Rates from "Means" - Include O.H. & P.)

II. FLOODPROOFING - 18'x20' House
(Perim = 76')

A. DRAINS & SUMP PUMP

1. Breaking up slab around cellar floor
Rent air compressor @ \$50/day for 1 day \$50.
1 Worker for 1 day: \$14.00/hr x 8 hrs/day 117.
\$167.

2. Hand Excavate Trench, remove mat'l
from cellar; load & haul away
Assume: 2 men work crew @ \$31.50/hr
Trench 2' dp, 2' wd. @ base,
1 1/2 sides

$\frac{1}{2}(4+2) 2 = 6 \text{ sq. ft.}$
Inside perim. 2' from wall: 60'
Volume = $360/27 = 13 \text{ cy.}$

Assume: 2 laborers can dig 12 cy/day
2 " " move 24 cy/day

1 day digging @ \$31.50/hr x 8 hrs/day \$252.
1/2 day loading @ \$31.50/hr x 8 hrs/day 126.

Dump Truck (6 cy) @ \$135/day 135
Pay loader: 4 hrs @ \$34/hr 136
\$649.

3. Backfill - crushed stone
14 cy @ \$6/cy (mat'l) \$84
6 hrs labor @ \$14.00/hr 84
\$172.

JOB NO. 79-162.1
DATE 5/22/79
BY R.K. Bailey
CH'D BY J. L. AD



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 12/42
JOB PITSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

4. 6" V.C.P.
601 f @ \$ 4/1 f. (including installation) \$ 240.
5. Replacing Concrete
4' x 1/2' x 601 f / 27 =
3 cy @ \$ 110/cy 330.
6. Sump Pump, Hose, Install Outlet 275
7. Clean up, Replace tiles, etc.
8 hrs @ \$ 14.60/hr 117
- TOTAL \$ 1,950.

B. WATERPROOF WALLS

1. Excavate Trench Around House
Assume: 3.5' wd. x 6' dp.
Outside perim.: 100' (2' from wall).
Volume = 3.5' x 6' x 100' / 27 =
78 cy @ \$ 2.80/cy \$ 218.
2. Clean Walls, Apply Waterproofing
8' ht. x 76' perim =
608 s.f. @ \$ 1/s.f. 608
3. Backfill Trench w/ Compaction
78 cy @ \$ 3.60/cy 281
4. Restore Site (Clean up, Replace
Shrubs, Fences, etc.) 340.

TOTAL \$ 1,447.
TOTAL IA & IB \$ 3,397.

JOB NO. 70-162.1
DATE 5/25/70
BY P.K. Bagley
CHK'D BY J. (S) R



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 13/35
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

C. BLOCK UP WINDOWS

1. Remove Exist. Windows

Assume; 6 windows @ 2 hrs. labor/ea.
12 hrs. @ \$14.60/hr. \$175.

2. Material - Concrete Blocks

6 windows x 16" x 32" / ea / 144 =
21 s.f. @ \$0.70/s.f. 15.

3. Installation

Assume; 1 Bricklayer @ \$18.55/hr.
1 1/2 hrs. x 6 x \$18.55/hr = \$167.
Use Same As For Removal

175

\$365.

Total	PART IA :	\$1,950.
"	" IB :	1,447
"	" IC :	365

TOTAL PART I: \$3,762.

JOB NO. 79-162.1
DATE 5/22/79
BY R.K. Beasley
CH'D BY S. J. Hall



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 14/155
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.C.E.

II. RAISING FOUNDATION

A. EXISTING CELLAR

1. Disconnect & Restore Lines
Heating, sewer, water, gas, electric,
telephone etc. lines must be cut &
extended, junction boxes installed, etc.
L.S. Estimate \$1,700.
2. Underpinning - Jacking
Mobilization \$ 700.
Elevate structure - Cut walls,
jack, place cribbing, etc.
Labor: 2 days - 2 mechanics, 3 laborers
Mechanics: \$21/hr x 2 x 6 x 2 672
Laborers: \$14.60/hr x 3 x 6 x 2 701
Equipment Rental For Duration 1,200
\$3,273.
3. Masonry
Pour or lay new foundation, fix all
stairways, fix or pour new floor slabs
Assume:
- 3' foundation x 76' perim (new fdn.
walls) @ \$3/sf \$ 684
- Stairways & slab (Assume
1 mason & helper)
\$33.25 (combined) / hr x 1 1/2 days x 8 399.
\$1,083.

JOB NO. 79-162.1
DATE 5/22/79
BY R.K. Eschew
CH'D BY J. K. Eschew



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 15/35
JOB PITTSFIELD
SUBJECT Flood Rating
CLIENT C.O.E.

4. Materials

Lines, pipes, brick/block/concrete, etc.
Estimate L.S. \$225.

5. Restoration

Clean up, shrubs, lawn, plaster cracked
walls, restore basement, repair
porches, etc. 850

6. Care for Occupants

Housing for duration, moving of
valuables, etc.
Assume:
30 day duration @ \$65/day 1,950
TOTAL \$9,081.

TOTAL PART I: \$3,762.

TOTAL PART IIA: 9,081

TOTAL PARTS I, IIA, IIC, IIA: \$12,843.

JOB NO. 79-162.1
DATE 5/22/79
BY R. K. Bagley
CHK'D BY J. D. H. H.



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 16/38
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

COSTS

CASE "A" - DRAINAGE SYSTEM WITH SUMP PUMP (See pp. 10 & 11, IA)

Raw Cost :	\$1,950 (pg. 11)
10% Contingencies :	195
General Contractor Oth & P (10%) :	195
	<u>\$2,340.</u>
Engineering & Survey (20%)	<u>468.</u>
	\$2,808.

COST / PERIM. FT. = $\$2,808 / 76' = \$36.95 / \text{ft.}$

CASE "B" - DRAINAGE SYSTEM, SUMP PUMP & WATERPROOFING (See pp. 10 & 11, IA & IB)

Raw Cost :	\$3,397. (pg. 11)
10% Contingencies :	340.
General Contractor Oth & P (10%) :	340.
	<u>\$4,077.</u>
Engineering & Survey (20%)	<u>815</u>
	\$4,892.

COST / PERIM. FT. = $\$4,892 / 76 = \$64.37 / \text{ft.}$

JOB NO. 79-167-1
DATE 5/22/79
BY R.K. Bailey
CHK'D BY J. V. M.



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 17/34
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

CASE "C" - DRAINAGE SYSTEM, SUMP PUMP,
WATERPROOFING & BLOCK UP WINDOWS
(See pp. 10-12; IA, IB & IC)

Raw Cost:	\$3,762. (Pg. 12)
10% Contingencies:	376.
General Contractor Olt & P (10%):	376.
	<u>\$4,514.</u>
Engineering & Survey (20%):	<u>903.</u>
	\$5,417.

COST / PERIM: FT. = $\$5,417 / 76 = \$71.28 / \text{ft.}$

CASE "D" - RAISE HOUSE 3 FEET
(See pp. 13-14, IIA).

Raw Cost:	\$9,081.
10% Contingencies:	908.
General Contractor Olt & P (10%):	908.
	<u>\$10,897.</u>
Engineering & Survey (10%):	<u>1,090.</u>
Lump Sum	\$11,987.

JOB NO. 79-1162
DATE 5/28/79
BY R.K. Farnley
CH'D BY J. (1574)



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 12/18
JOB ATTYFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

(Wage Rates From "Means" - Include OH & P).

II. FLOODPROOFING - 35' x 50' House
(Perim = 170 feet).

A. DRAINS & SUMP PUMP

1. Break up slab around cellar floor
Rent air compressor : 2 days @ \$50/day = \$100.
1 Worker for 2 days : 16 hrs @ \$14.60/hr = 234.
\$ 334.

2. Hand excavate trench, remove mat'l
from cellar, load & haul away
Assume : 2 man crew @ \$31.50/hr
Trench 2' dpx 2' wd @ base,
1 1/2 sides

$$\frac{1}{2}(4+2)2 = 6 \text{ sq. ft.}$$

Inside perim, 2' from wall : 154'

$$\text{Volume} = 924/27 = 34 \text{ c.y.}$$

Assume : 2 laborers can dig 12 cy/day
2 " " move 24 cy/day

3 days digging @ \$31.50/hr x 8 hrs/day = 756
1 1/2 days loading @ \$ " " x " " = 378

Dump Truck (6 cy) @ \$135/day = 135
Payloader : 4 hrs @ \$34/day = 136
\$ 1,405.

B. Backfill - Crushed Stone

34 c.y. @ \$6.00/cy (mat'l) = \$ 204.
12 hrs. labor @ \$14.60/hr = 175.
\$ 379.

JOB NO. 79-162
DATE 5/23, 79
BY R.K. Bagley
CH'D BY S. J. Hall



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 19/38

JOB PITTSFIELD
SUBJECT FLOOD PROOFING
CLIENT C.G.F.

4. 6" V.C.P.
154 L.F. @ \$4/LF (including installation) = \$616.
 5. Replace Concrete
4' x 4 1/2" thk x 154 l.f. / 27 =
7.6 c.y. @ \$110/cy = 837
 6. Sump Pump, Hose, Install Outlet 275
 7. Clean-up, replace tiles, etc.
12 hrs @ \$14.60/hr = 175
- TOTAL ————— \$4,021.

B. WATERPROOF WALLS

1. Excavate Trench Around House
Assume: 3.5' wd x 6' dp
Outside perim: 194' (2' from wall)
Volume = 3.5' x 6' x 194' / 27 =
150 c.y. @ \$2.80/cy = \$420.
 2. Clean walls, Apply Waterproofing
8' ht x 170' perim =
1,360 s.f. @ \$1/s.f. = 1,360.
 3. Backfill & Compact Trench
150 c.y. @ \$3.60/cy = 540.
 4. Restore Site (Clean Up, Restore shrubs, fences, etc.) 340
- TOTAL ————— \$2,660.
- B-19 TOTAL IIA & IIB ————— \$6,681.

JOB NO. 79-162
DATE 5/25/79
BY R.K. Bagley
CH'D BY S. H. H. H.



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 20/38
JOB PITTSFIELD
SUBJECT FLOOD PROOFING
CLIENT C.O.E.

C. BLOCK UP WINDOWS

1. Remove Exist. Windows

Assume: 8 windows @ 2 hrs. labor/ea.
16 hrs. @ \$14.60/hr = \$234.

2. Material - Concrete Blocks

8 windows x 16" x 32" ea / 144 =
28 s.f. @ \$0.70/sf = 20.

3. Installation

Assume: 1 Bricklayer @ \$18.55/hr
1 1/2 hrs. x 8 x \$18.55/hr = \$222.60
Use Same As For Removal 234.

TOTAL ————— \$488.

TOTAL PART I A :	\$4,021
" " I B :	2,660.
" " I C :	488.

TOTAL PART I : \$7,169.

JOB NO. 79-162.1
DATE 5/22/79
BY R.K. Beasley
CH'D BY J. V. AL



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 21/33
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

II. RAISING FOUNDATION

A. EXISTING CELLAR

1. Disconnect & Restore Lines
Heating, sewer, water, gas, electric,
telephone etc. lines must be cut &
extended, junction boxes installed, etc.
L.S. Estimate \$1,700.

2. Underpinning - Jacking
Mobilization \$ 700
Elevate structure - Cut walls,
jack, place cribbing, etc.
Labor: 4 days - 2 mechanics, 3 laborers
Mechanics: \$21/hr x 4 x 6 x 2 1,344
Laborers: \$14.00/hr x 4 x 6 x 3 1,401
Equipment Rental For Duration 1,200
\$4,645.

3. Masonry
Pour or lay new foundation, fix all
stairways, fix or pour new floor slabs
Assume:
- 3' foundation x 170' perim (new fdn.
walls) @ \$3/sf \$ 1,530
- Stairways & slab (Assume
1 mason & helper)
\$33.25 (combined)/hr x 3 days x 8 798
\$ 2,328

JOB NO. 79-162.1
DATE 5/23/79
BY R.K. Deaky
CH'D BY J. K. Deaky



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 22/28
JOB PITTSFIELD
SUBJECT Flood framing
CLIENT C.O.E.

4. Materials

Lines, pipes, brick/block/concrete, etc.

Estimate L.S.

\$225.

5. Restoration

Clean up, shrubs, lawn, plaster cracked
walls, restore basement, repair
porches, etc.

1,150.

6. Care for Occupants

Housing for duration, moving of
valuables, etc.

Assume:

30 day duration @ \$65/day 1,950

TOTAL ——— \$11,998.

TOTAL PART I: \$7,169

TOTAL PART IIA: 11,998.

TOTAL PARTS I, IIA, IIC, IIA: \$19,167.

JOB NO. 79-162.1
DATE 5/23/79
BY R. K. Bagley
CHK'D BY J. R. Ryan



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 23/28
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

COSTS

CASE "A" - DRAINAGE SYSTEM WITH SUMP PUMP

(See pp. 18 & 19, IA)

Raw Cost :	\$ 4,021. (pg. 19)
10% Contingencies :	402.
General Contractor Off & P (10%) :	402
	<u>\$ 4,825</u>
Engineering & Survey (20%)	<u>965</u>
	\$ 5,790.

COST / PERIM. FT. = $\$5,790 / 170' = \$34.00 / \text{ft.}$

CASE "B" - DRAINAGE SYSTEM, SUMP PUMP & WATERPROOFING

(See pp. 18 & 19, IA & IB)

Raw Cost :	\$ 6,681. (pg. 19)
10% Contingencies :	668
General Contractor Off & P (10%) :	668
	<u>\$ 8,017.</u>
Engineering & Survey (20%)	<u>1,603.</u>
	\$ 9,620.

COST / PERIM. FT. = $\$9,620 / 170 = \$56.60 / \text{ft.}$

JOB NO. 73-142.1
DATE 5/23/79
BY R.K. Bailey
DHD BY J. V. 1/13/84



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 24/38
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

CASE "C" - DRAINAGE SYSTEM, SUMP PUMP,
WATERPROOFING & BLOCK UP WINDOWS
(See pp. 18-20, IIA, IB & IC)

Raw Cost:	\$ 7,169. (pg. 20)
10% Contingencies:	717.
General Contractor Olt & P (10%)	717.
	<u>\$ 8,603.</u>
Engineering & Survey (20%):	<u>1,721.</u>
	\$ 10,323

COST / PERIM. FT. = $\$10,323 / 170 = \$60.70 / \text{ft.}$

CASE "D" - RAISE HOUSE 3 FEET
(See pp. 21-24, IIA).

Raw Cost:	\$ 11,998.
10% Contingencies:	1,200
General Contractor Olt & P (10%)	<u>1,200</u>
	\$ 14,398.
Engineering & Survey (10%):	<u>1,440.</u>
Lump Sum	\$ 15,838.

JOB NO. 79-163.1
DATE 5/23/79
BY R K Bagley
CH'D BY J L STAN



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 25/33

JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

(Wage Rates From "Means" - include G.H. & P.)

II. FLOODPROOFING - 50' x 62' HOME
(Perim = 224 feet)

A. DRAINS & SUMP PUMP

1. Breaking up slab around cellar floor
Rent air compressor @ \$50/day x 3 days \$ 150.
1 worker for 3 days; 24 hrs. @ \$14.00/hr 350.
(Includes cleanup) \$ 500.

2. Hand excavate trench, remove mat'l
from cellar; load & haul away
Assume: 2 man crew @ \$31.50/hr.
Trench 2'dp. x 2'wd @ base,
1:2 sides

$$\frac{1}{2} (4+2) 2 = 6 \text{ sq. ft.}$$

Inside perim. 2' from wall: 208'

$$\text{Volume} = 1248/27 = 46 \text{ cy.}$$

Assume: 2 laborers can dig 12 cy/day
2 " " move 24 cy/day

4 days digging @ \$31.50/crew x 8 hrs/day \$1,008.
2 days loading @ \$31.50/crew x 8 hrs/day 504

Dump Truck (6 cy) @ \$135/day 135.
Pay loader: 4 hrs @ \$34/hr 136.
\$ 1,783.

3. Backfill - crushed stone
46 cy. @ \$6/cy. (mat'l) \$ 276.
16 hrs labor @ \$14.00/hr 224
\$ 510

JOB NO. 77-162.1
DATE 5/22/79
BY R B Bailey
CHK'D BY J LISTAD



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 26/38
JOB Pittsfield
SUBJECT Flood Proofing
CLIENT C.O.E.

4. 6" V.C.P.
208 l.f. @ \$4 / l.f. (including installation) \$832.
5. Replacing Concrete
4' x 4 1/2 thk. x 208 l.f. / 27 =
10.3 c.y. @ \$110 / c.y. 1,133.
6. Sump Pump, hose, Install Gutter 400.
7. Clean up, Replace tiles, etc.
16 hrs. @ \$14.60 / hr. 234
- TOTAL \$5,392.

B. WATERPROOF WALLS

1. Excavate Trench Around House
Assume: 3.5' wd x 6' dp.
Outside perim: 250' (2' from wall)
Volume = $3.5 \times 6 \times 250 / 27 =$
194 c.y. @ \$2.80 / c.y. \$543.
2. Clean Walls, Apply Water-proofing
8' ht x 224' perim =
1,792 sf. @ \$1. / sf. 1,792.
3. Backfill Trench w/ Compaction
194 c.y. @ \$3.60 / c.y. 698
4. Restore Site (Clean up, Replace
Shrubs, Fences, etc.) 340
- TOTAL \$3,373
- TOTAL IA & IB \$8,765.
B-26

JOB NO. 79-162-1
DATE 5/23/79
BY R.K. Bailey
CHK'D BY J. L. Taylor



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 27/28
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

C. BLOCK UP WINDOWS

1. Remove Exist. Windows
Assume: 12 windows @ 2 hrs. labor/ea.
24 hrs. @ \$14.60/hr. \$350.

2. Material - Concrete Blocks
12 windows x 16" x 32" / ea. / 144 =
42 s.f. @ \$0.70/s.f. 29.

3. Installation
Assume: 1 Bricklayer @ \$18.55/hr.
1 1/2 hrs x 12 x \$18.55 = \$334.
Use Same As For Removal 350

TOTAL \$ 729

<u>TOTAL</u>	<u>PART IA</u>	:	\$ 5,392.
"	"	<u>IB</u>	3,373.
"	"	<u>IC</u>	729

TOTAL PART I: \$ 9,494

JOB NO. 79-162.1
DATE 5/23/79
BY R.K. Bagley
CH'D BY C. L. ...



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 28/28
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

II. RAISING FOUNDATION

A. EXISTING CELLAR

1. Disconnect & Restore Lines

Heating, sewer, water, gas, electric, telephone etc. lines must be cut & extended, junction boxes installed, etc.

L.S. Estimate \$1,700.

2. Underpinning - Jacking

Mobilization

\$700.

Estimate to cut walls, underpin, jack up, place cribbing, etc.

Labor: 5 days - 2 mechanics, 3 laborers

Mechanics: \$21/hr x 5 x 8 x 2 1,680.

Laborers: \$14.60/hr x 3 x 8 x 3 1,752

Equipment Rental For Duration 1,200.

\$5,332.

3. Masonry

Four or lay new foundation, fix all stairways, fix or pour new floor slab.

Assume:

- 3' foundation x 224' perim (new fdn. walls) @ \$3./sf. \$2,916.

- Stairways & slab (Assume 1 mason & helper)

\$33.25 (combined)/hr. x 4 days x 8 1,064.

\$3,080.

JOB NO. 79-162.1
DATE 5/22/79
BY R. K. Bailey
CHK'D BY J. Ristau

**HH
&B** HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 20/24
JOB PITTSFIELD
SUBJECT Elm. Procting
CLIENT C.O.E.

4. Materials

Lines, pipes, brick / block / concrete, etc.
Estimate L.S. \$ 450.

5. Restoration

Clean up, shrubs, lawn, plaster cracked
walls, restore basement, repair
porches, etc. 1,450

6. Care for Occupants

Housing for duration, moving of
valuables, etc.

Assume:

30 day duration @ \$65 /day 1,950

TOTAL \$13,962.

TOTAL PART I : \$ 9,494

TOTAL PART IIA : 13,962

TOTAL PARTS I, IIA, IIB, IIC & IIA : \$ 23,456

JOB NO. 70-162.1
DATE 5/24/79
BY R.K. Barlow
CHK'D BY J. Distefano



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 30/33
JOB PITTSFIELD
SUBJECT Flood Damage
CLIENT C.O.E.

COSTS

CASE "A" - DRAINAGE SYSTEM WITH SUMP PUMP (See pp. 20 & 21; IA)

Raw Cost :	\$ 5,392	(pg. 20)
10% Contingencies :	539	
	<u>\$ 5,931</u>	
General Contractor's OH & P (10%) :	539	
	<u>\$ 6,470.</u>	
Engineering & Survey (20%) :	<u>1,294</u>	
	<u>\$ 7,764.</u>	

COST / PERIM. FT. = $\$7,764 / 224 = \$34.66 / \text{ft.}$

CASE "B" - DRAINAGE SYSTEM, SUMP PUMP & WATERPROOFING (See pg. 20, IA & IB)

Raw Cost :	\$ 8,765	(pg. 20)
10% Contingencies :	877	
	<u>\$ 9,642</u>	
General Contractor's OH & P (10%) :	877.	
	<u>\$ 10,519.</u>	
Engineering & Survey (20%) :	<u>2,104</u>	
	<u>\$ 12,623</u>	

COST / PERIM. FT. = $\$12,623 / 224 = \$56.35 / \text{ft.}$

JOB NO. 79-162.1
DATE 5/24/79
BY R.K. Gasky
CH'D BY J. LISTAK



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 31/38
JOB PITTSFIELD
SUBJECT Flood Proofing
CLIENT C.O.E.

CASE "C" - DRAINAGE SYSTEM, SUMP PUMP,
WATERPROOFING & BLOCK UP WINDOWS
(See pp. 25-27: IA, IB & IC).

Raw Cost :	\$ 9,494 (pg. 27)
10% Contingencies :	949
	<u>\$ 10,443.</u>
General Contractor OH & P (10%) :	949
	<u>\$ 11,392.</u>
Engineering & Survey (20%) :	2,278
	<u><u>\$ 13,670</u></u>

COST / PERIM. FT. = $\$13,670 / 224 = \$61.03 / \text{ft.}$

CASE "D" - RAISE HOUSE 3 FEET.
(See pp. 28-29, IIA).

Raw Cost :	\$ 13,962. (pg. 29)
10% Contingencies :	1,396.
	<u>\$ 15,358</u>
General Contractor OH & P (10%) :	1,396
	<u>\$ 16,754</u>
Engineering & Survey (10%) :	1,675
	<u><u>\$ 18,429</u></u>

LUMP SUM \longrightarrow \$18,429

JOB NO. 75-162-1
DATE 5/24/79
BY R K Bailey
CH'D BY [Signature]



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 32/28

JOB PITTSFIELD
SUBJECT Flood Protection
CLIENT C.B.E.

COST OF FLOOD BARRIERS

1. Install permanent ppe sleeve in ground.
Includes: excavation, sleeve placement,
grouting, backfill, patching pavement
of grassed area.
Estimate Lump Sum / Ea. \$100.
 2. Flood Barrier Frame
Say a 10' Section will be 10' Lg x 2' Ht.
Use 1/2" plywood on a frame of 2"x3"s.
Frame top & bottom, ends & insert a
stress diagonal.
Total Length (2x3's): $[2(10') + 2(2') + 10(2')]$
@ \$11 / LF 34.
 3. Plywood Barrier
10' x 2' @ \$0.60 / sf 12.
 4. Waterproofing
10' x 2' @ \$0.40 / sf 8.
 5. Joint Seal & Bottom Apron
Joints: 2' @ \$0.50 / LF 1.
Bottom: 10' @ \$0.80 / LF 8

\$163.
- \$163 / 10' = \$16.30 / LF.

JOB NO. 79-162
 DATE 5/23/79
 BY R. K. BACLEY
 CH'D BY D. GAGGIN



HAYDEN, HARDING & BUCHANAN, INC.
 CONSULTING ENGINEERS
 BOSTON, MASSACHUSETTS

SHEET NO. 33/38
 JOB DITCHFIELD
 SUBJECT FLOOD STUDY
 CLIENT C.O.E.

DEMOLITION COSTS

BASED UPON \$0.10 / CF

SOUTHWEST BRANCH

NOTE: ALL RESIDENCES EXCEPT AS NOTED.

<u>REAR 2</u>	<u>100 YR.</u>	<u>S.P.F.</u>
114 BARKER RD.		1900
CADWELL RD (ARMORY GARAGE)		3900
106 CADWELL RD.	5000	5000
111 " "		2300
116 " "	2400	2400
120 " "	2100	2100
123 " "		1400
127 " "		1000
130 " "	2000	2000
131 " "		800
136 " "		1600
141 " "		1900
190 " "	3100	3100
200 " " (COMM.)	1200	1200
203 " "	1600	1600
207 " "	2400	2400
229 " "		2300
231 " "		1500
233 " "	2000	2000
OFF CADWELL RD.	2000	2000
2 GALE AVE.	2100	2100
8 " "	3700	3700
16 " "	3200	3200
22 " "	3100	3100
27 " "		3600

JOB NO. 79-1162
 DATE 5/23/79
 BY R.K. BAGLEY
 CH'D BY D. GAQUIN



HAYDEN, HARDING & BUCHANAN, INC.
 CONSULTING ENGINEERS
 BOSTON, MASSACHUSETTS

SHEET NO. 34/38
 JOB PITTSFIELD
 SUBJECT FLOOD STUDY
 CLIENT C.O.F.

SOUTHWEST BRANCH

REACH 2 (CONT'D)

			<u>100 Yr.</u>	<u>S.A.F.</u>
	W GREENDALE AVE.		500	500
	223 JACKSON ST.			2700
	427 W. HOUSATONIC ST.			3400
	433 " "		4400	4400
	" " (BIG "N")	510,000		510,000
	" " (MCDONALD'S)	7200		7200
	472 " "		1300	1300
	" " (FITZMOTEL)	13200		13200
	" " (DINER)	1200		1200
*	484 " " (SHELL STATION)	18300		18300
*	" " (SUNOCO STATION)	24000		24000
	490 " "		1600	1600
	565 " "			1400
	572 " "			2700
	573 " "		1600	1600
	577 " "		1800	1800
	578 " "		1600	1600
*	581 " " (MOBIL STATION)	17400		17400
	582 " "		2100	2100
	586 " "		2200	2200
	590 " "		1300	1300
	591 " "			1900
	596 " "		1800	1800
	595-597 " " (APART.)			4000
	607 " " (BODY SHOP)	5000		5000
	615 " " (TIRE SHOP)	7200		7200

* WORK INCLUDES REMOVAL OF UNDERGROUND GAS TANKS.
 B-34

JOB NO. 79-112
 DATE 5/23/79
 BY R.K. EAGLE
 CH'D BY D. GAQUIN

HH & B HAYDEN, HARDING & BUCHANAN, INC.
 CONSULTING ENGINEERS
 BOSTON, MASSACHUSETTS

SHEET NO. 35/38
 JOB PITTSFIELD
 SUBJECT FLOOD STUDY
 CLIENT C.G.E.

SOUTH WEST BRANCH

REACH 2 (CONT'D)

	<u>100 Yr.</u>	<u>S.P.F.</u>
20 WOODLEIGH RD.		1800
30 " "		2400
9-11 ZORR ST (APART.)	2700	2700
15-17 " " (APART.)		2700

WEST BRANCH

REACH 2

	<u>100 Yr.</u>	<u>S.P.F.</u>
301 COLUMBUS AVE. (RIVERSIDE CAFE)		2300
73 R DEWEY AVE.	1900	1900

REACH 3

300 COLUMBUS AVE (WEST SIDE FISH MKT.)		2600
97 DEWEY AVE (MILTON'S PLACE)	500	500
102 " "		9800
107 " "		2300
111 " "		2600
113 " "		1600
114 " "		3700
117, 119 & 121 " "		8200
125 " "		1600
129 " "		2300

JOB NO. 79-162
 DATE 5/23/79
 BY R.K. BAGLEY
 CH'D BY D. GAQUIN



HAYDEN, HARDING & BUCHANAN, INC.
 CONSULTING ENGINEERS
 BOSTON, MASSACHUSETTS

SHEET NO. 36/38
 JOB PITTSFIELD
 SUBJECT FLOOD STUDY
 CLIENT C.O.E.

WEST BRANCH

REACH 3 (CONT'D)

	<u>100 Yr.</u>	<u>S.P.F.</u>
135-137 DEWEY AVE. (APART.)		4000.
141 " "		3700
143-145 " " (APART.)		3700
147 " "		3700
155 " "		2600
159 " "		2600
165 " " (COMM.)	4900	4900
169 " "		2300
175 " "		2300
56 JOHN ST. (BERKSHIRE BAKERY)	28100	28100
62-68 R " " (COMM.)		9000
90 " "		4000
104 " "		3500
* 198 LINDEN ST. (AMOCO STATION)	20,000.	20,000.
53 PROSPECT ST.		6100.
24 SOUTHERN AVE.		4000
28 " " (APART.)		3100

* INCLUDES REMOVAL OF UNDERGROUND GAS TANKS.

JOB NO. 79-162
DATE 5/23/79
BY R.K. BACLEY
CH'D BY D. GAQUIN



HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 37/39
JOB PITTSFIELD
SUBJECT FLOOD STUDY
CLIENT C.O.E.

WEST BRANCH

REACH 4

	<u>100 YR.</u>	<u>S.P.F.</u>
72-74 DANFORTH AVE. (APART.)		4000.
82 " "	2300.	2300.
84 " "		2300
88 " "		800
90-92 " " (APART.)		2600
94-96 " " (APART.)		4500
129 " " (APART.)		6900
132 " "		3100
3 DANIELS AVE. EXT.		1600
5 " " "		1900.
275 DEWEY AVE.		1600.
285 " "		2300
287 " "		4500
291 " "		3300
11 LEIGHOLD PL.		2300
14 " "		3600
LINDEN ST. (BOB'S AUTOMOTIVE)	1600	1600
202-204 " " (APART.)		6900
52 PARK ST. (BODY SHOP)		9000
57 " "		3100
77 " " (COMM.)	8400	8400
161 SEYMOUR ST. (RICHMOND BAKERY)		22600

JOB NO. 79-1162
DATE 5/23/79
BY R. K. BAGLEY
CH'D BY D. GAQUIN



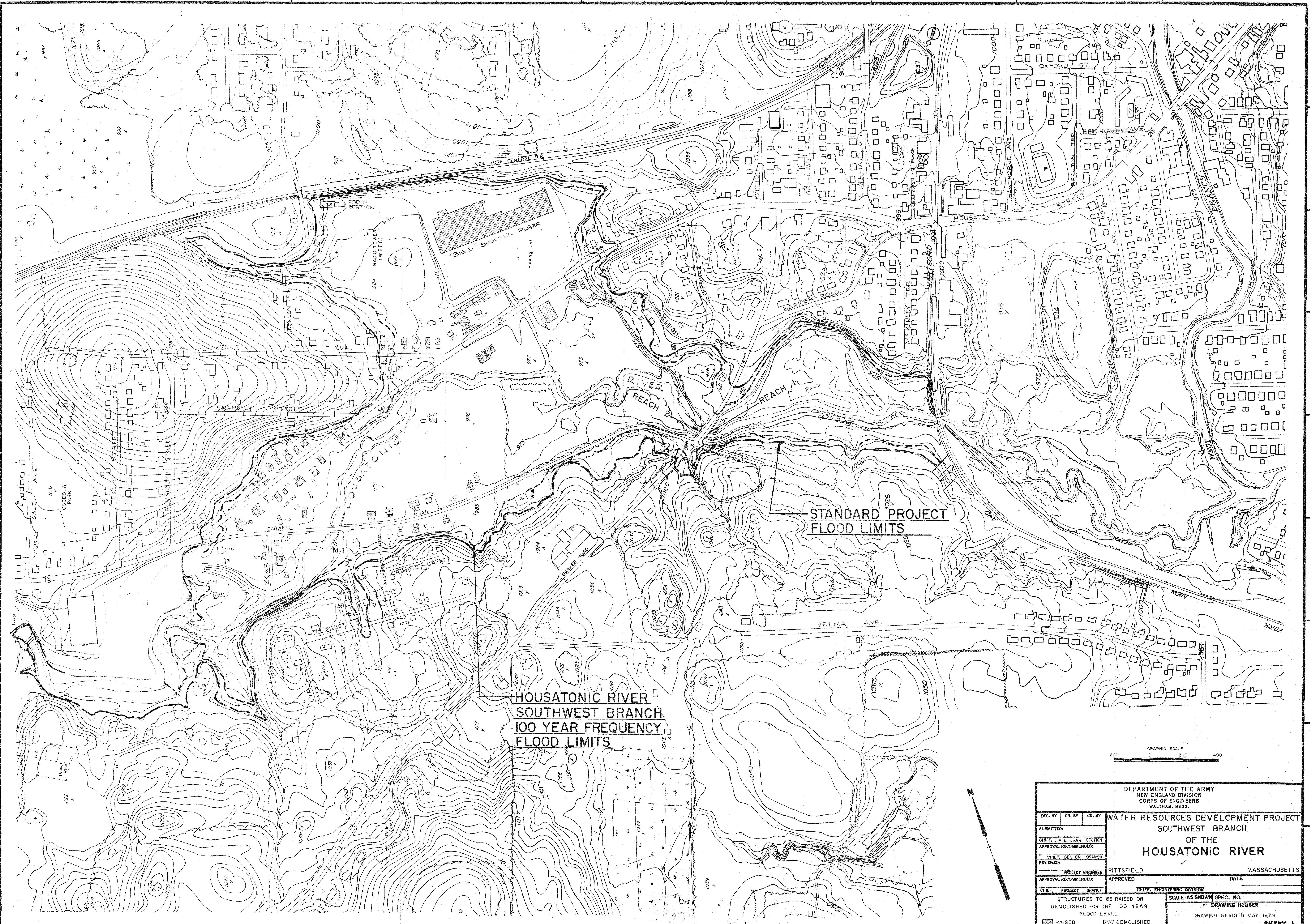
HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 38/38
JOB PITTSFIELD
SUBJECT FLOOD STUDY
CLIENT C.O.E.

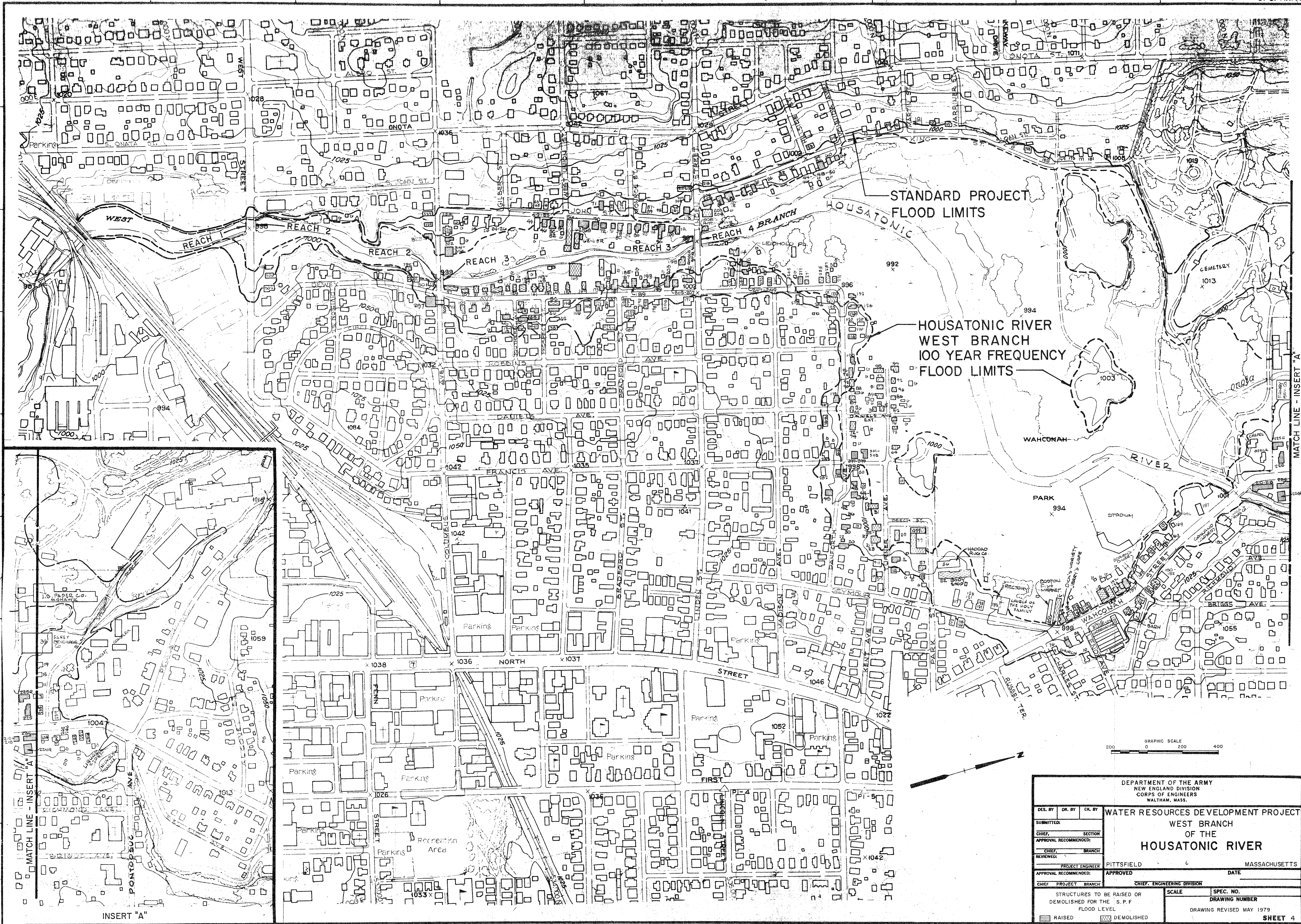
WEST BRANCH

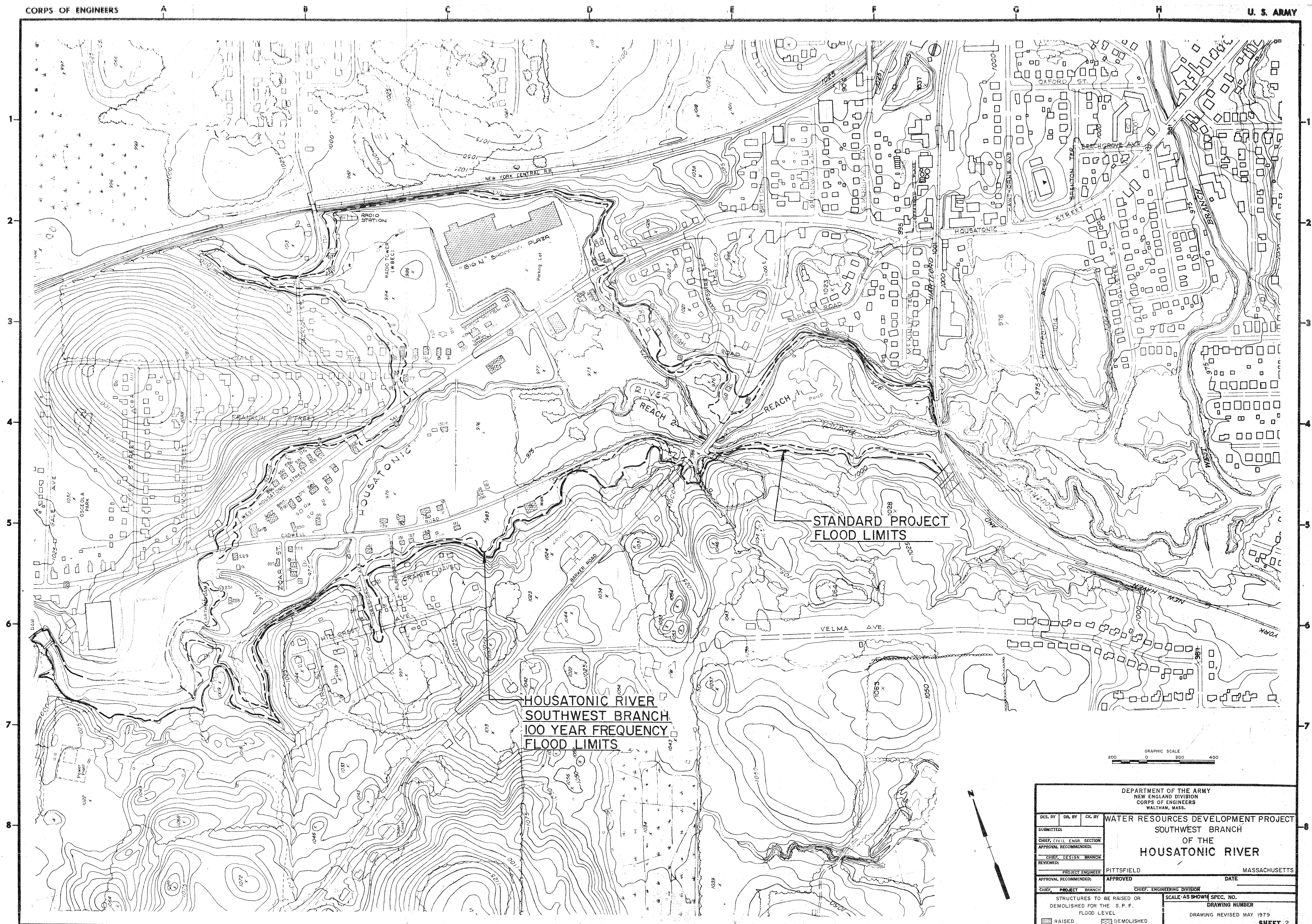
BRANCH 4 (CONT'D)

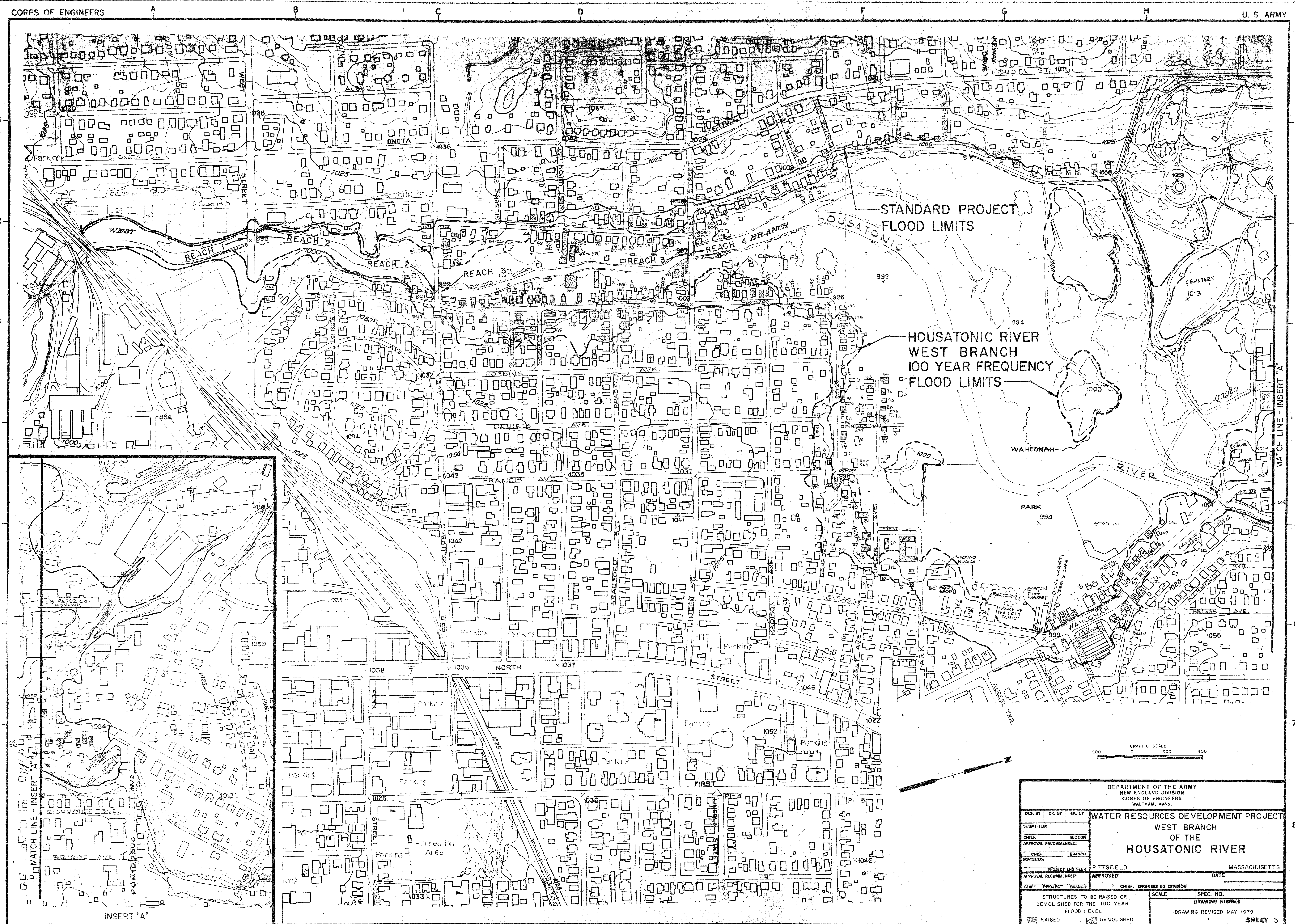
	<u>100 YR.</u>	<u>S.P.F.</u>
20 TURNER AVE.		3400
21-23 " " (APART.)		7100
25-27 " "		7100
31 " "	5100	5100
64 " "		3100
72 " "		1600
76 " "		1600
82 " "		1600
86 " "		1600
89 " "		4000
90 " "		1900
91 " "		2600
92 " "		1500
93 " "		2600
94 " "		4500
95 " "		4000
89 WATCONANT ST. (JERRY'S CAFE)		3400
115-123 " " (COMM.)		10800
127-133 " " (COMM.)		9600
169 R " "		1600

GRAPHIC SCALE
0 200 400

DES. BY			DR. BY			CK. BY			DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS WALTHAM, MASS.		
SUBMITTED:			PROJECT ENGINEER			PITTSFIELD			MASSACHUSETTS		
CHIEF, CIVIL ENGR. SECTION			APPROVED			DATE					
APPROVAL RECOMMENDED:			CHIEF, DESIGN BRANCH								
REVIEWED:			CHIEF, PROJECT BRANCH								
STRUCTURES TO BE RAISED OR DEMOLISHED FOR THE 100 YEAR FLOOD LEVEL			SCALE AS SHOWN SPEC. NO.			DRAWING NUMBER			DRAWING REVISED MAY 1979		
RAISED			DEMOLISHED						SHEET 1		







INSERT "A"

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.WATER RESOURCES DEVELOPMENT PROJECT
WEST BRANCH
OF THE
HOUSATONIC RIVERDES. BY
SUBMITTER
CHIEF, SECTION
APPROVAL RECOMMENDED:
CHIEF, BRANCH
REVIEWED:
PROJECT ENGINEER
APPROVAL RECOMMENDED:
CHIEF, PROJECT BRANCHPITTSFIELD
MASSACHUSETTS
DATESTRUCTURES TO BE RAISED OR
DEMOLISHED FOR THE 100 YEAR
FLOOD LEVELSCALE
SPEC. NO.
DRAWING NUMBER
DRAWING REVISED MAY 1979RAISED
DEMOLISHED

SHEET 3